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The DENTAL DIGEST

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JULY, 1934
Vol. 40 No. 7

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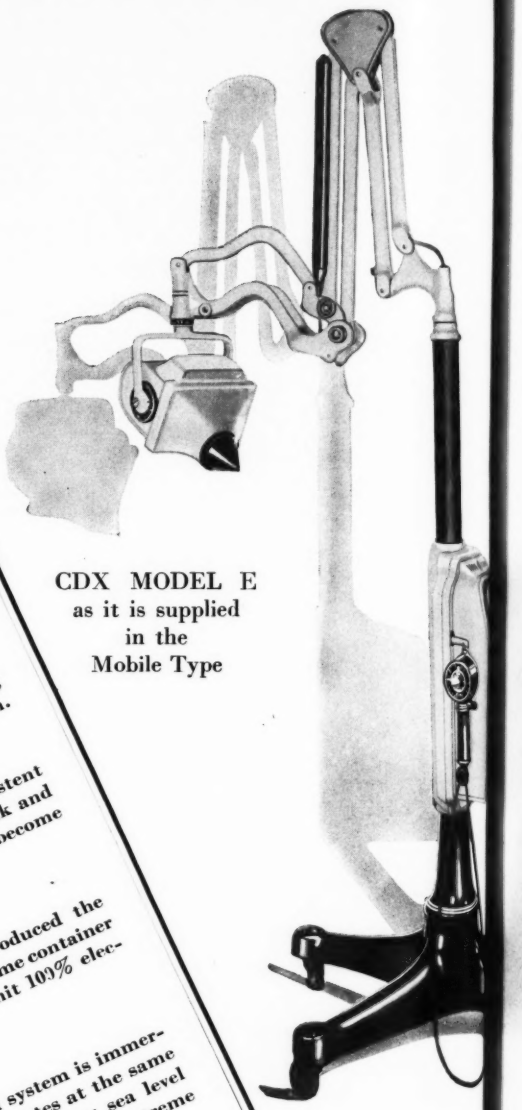

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The DENTAL DIGEST

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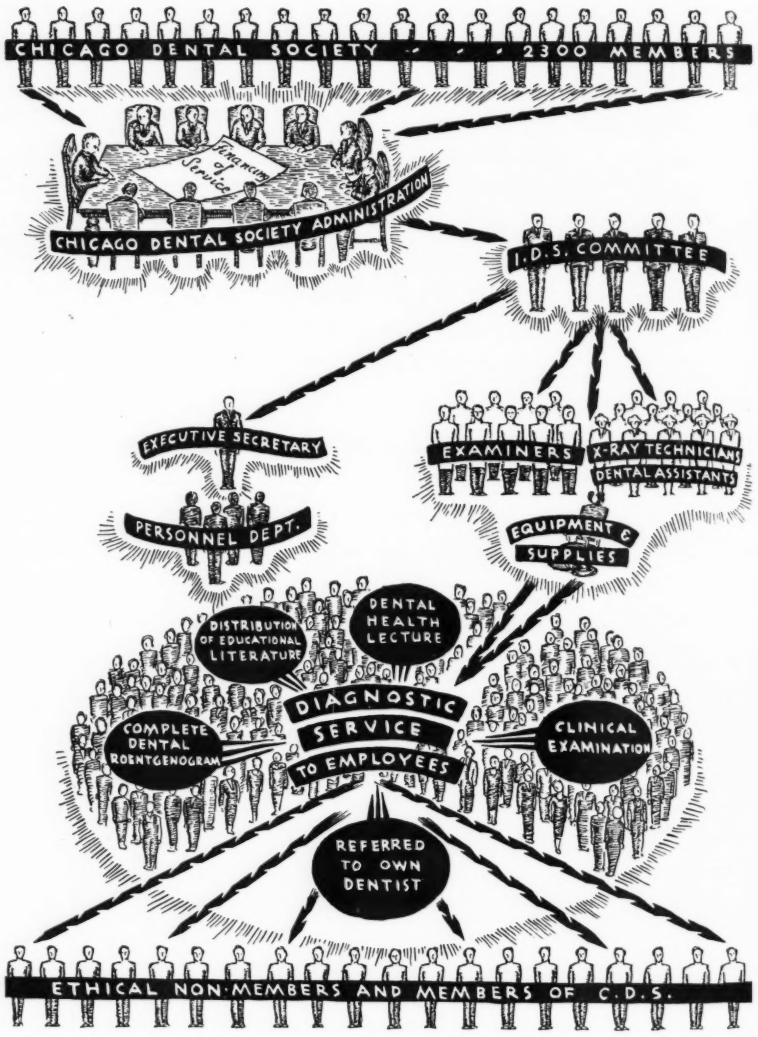
ORGANIZATION AND OPERATION OF THE INDUSTRIAL DIAGNOSTIC SERVICE OF THE CHICAGO DENTAL SOCIETY

STANLEY D. TYLMAN, A.B., D.D.S., M.S., Chairman*
Chicago

"IF THE mountain will not go to Mahomet, Mahomet must go to the mountain"—thus thought several members of the Chicago Dental Society in the summer of 1933. In other words, in view of the fact that the majority of the earning portion of the population appeared to procrastinate in the matter of seeking dental care, it was concluded that the profession must, in some ethical manner, go to these people and show them the error of their ways. The Chicago Dental Society's Industrial Diagnostic Committee began a serious study of the various plans and proposals to stimulate dental practice that had been formulated by various persons and organizations throughout the country. Some had been tried; others, not. All had one common denominator—they were not sufficiently effective to be accorded permanent status or even to be transferred from one community to another.

"Apparently we must put out of our minds all preconceived notions of how to rejuvenate dental practice," said one of the groups, "and start from scratch," and "start from scratch" they did. The result is the Industrial Diagnostic Service. At the time of writing, almost 3,000 employed persons in Chicago and hundreds of dentists have benefited as a result of its operation. The plan has received such favorable notice from the dental press that the daily mail of the Chicago Dental Society rarely fails to include one or more inquiries from some dental societies in other states, concerning its manner of operation. The scarcity of literature on the subject up to the present time has led us to publish this article. It is not intended to be all-inclusive or is it intended to be perfect or final. Specific local conditions will necessarily require certain modifications which the local society officials can best determine. It is believed, however, that the plan is sound in principle and lends itself to application in any urban community.



Definition and Purpose

The Industrial Diagnostic Service is a program of dental health education among employed persons in their places of employment, under the sponsorship of a dental society and with the cooperation of the employers. Its principal elements consists of (1) a fifteen or twenty minute introductory dental health talk to all employees in a group, (2) complete dental roentgenograms of each employee, (3) distribution of dental health literature, (4) clinical examination of each employee by a dentist, (5) reference of each employee to his own dentist for treatment, and (6) subsequent reexamination. (See under "Follow-Up Program.")

The purpose of the Industrial Diagnostic Service is twofold: first, effectively to educate gainfully em-

*The Committee of the Industrial Diagnostic Service of the Chicago Dental Society wishes to express its appreciation to all those who by their time and thought have made this program possible. Particularly do we wish to thank Mr. John J. Hollister, Executive Secretary of the Chicago Dental Society, for his many sound suggestions and unceasing efforts in effecting a successful culmination of a worthy project.

ployed persons to the value of regular dental care and complete the service by placing them in the hands of their own dentists for treatment, and second, coincidentally to stimulate the practices and thereby the incomes of dentists.

Method of Procedure

For purposes of illustration let us assume that the XYZ Manufacturing Company requests the service. The representative of the dental society calls upon the proper official of the company, usually the medical staff head or personnel official, to arrange the details. The application blank, shown elsewhere in this article, is filled out and signed by the proper official. Upon its acceptance by the society the wheels are set in motion.

First of all, an adequate supply of examination charts is delivered to the office of the company to have the lower portion of the chart filled out in triplicate *in advance*. Our experience has been that the company officials are glad to cooperate in this respect and results in a twofold benefit: (1) the assistant and consequently the examiner are saved a substantial amount of time on each examination, and (2) the incidence of clerical errors in recording names, addresses, and so on, is reduced to a minimum.

In order to introduce the subject to the employees the management is requested to issue a general memorandum to all employees at least a week in advance.

At the appointed hour the employees are gathered together in a group to listen to a short fifteen or twenty minute dental health talk given by a member of the society. For psychologic reasons this should be done on company time—not employees' and preferably at noon just before the lunch period. The purpose of this talk is (1) to impress upon the employees certain fundamental dental health facts that will arouse their interest and thus facilitate their cooperation; (2) to outline the program about to be inaugurated.

Immediately following the lecture the taking of the roentgenograms is begun. For this purpose an x-ray machine has been sent out in advance and has been made ready for use on the plant premises. Likewise, a supply of films, sterilizing solutions, basins, and other equipment have been sent. The x-ray technician employed by the society then proceeds to make fourteen film roentgenographic examinations of the mouth of each employee. At the end of the day the sets of films are sent to an x-ray laboratory for developing and mounting, and as soon as this has been completed they are returned to the plant, each in a manila envelope to prevent loss of films, and filed alphabetically, or by company check number, for the use of the dentist who subsequently makes the clinical examination.

CHICAGO DENTAL SOCIETY
INDUSTRIAL DIAGNOSTIC SERVICE
APPLICATION

_____ 193__

1. Name of Company _____
2. Address _____ Tel. No. _____
3. Total No. of employees _____
4. Working hours _____ from _____ A.M. to _____ P.M.
   (a) No. of employees _____
   Extra Shifts.
   1. From _____ A.M. P.M. to _____ A.M. P.M.
      (a) No. of employees _____
   2. From _____ A.M. P.M. to _____ A.M. P.M.
      (a) No. of employees _____
   3. From _____ A.M. P.M. to _____ A.M. P.M.
      (a) No. of employees _____
5. Contact person _____ Title _____
6. Date speaker desired _____ Hour _____
7. Date X-ray machine to be delivered _____
8. _____ (special delivery instructions)
9. Electric current _____ Volt _____ A.C. or D.C. _____ cycles _____ phase

In applying for this service the Company understands that it is to be rendered without charge either to it or any of its employees. In lieu thereof the Company agrees to provide physical facilities for both the roentgenographic and clinical examinations and necessary electric current incident thereto; release from their duties for a sufficient period of time and at proper intervals, not less than 50 employees per working day for the making of the dental roentgenograms and clinical examinations; permit the distribution among employees of dental health literature; when indicated to grant employees a reasonable amount of time from duty without penalty to have their dental work done; and to use all proper means to secure complete compliance with this health program on the part of all employees.

Accepted _____ 193_
INDUSTRIAL DIAGNOSTIC SERVICE COMMITTEE
CHICAGO DENTAL SOCIETY
_____
Chairman

Company _____
By _____
Title _____

The physical set-up is made for the clinical examination of each employee. The dentist employed by the society, with the aid of the roentgenograms and pulp tester, makes a careful examination, and his findings, including the name and address of the employee's dentist, are recorded in triplicate on a special examination chart. The original is for the records of the Committee, the duplicate to be attached to the original and retained in the Committee files to be sent to the employee's dentist only upon his request. It is not sent to the dentist with the roentgenogram and other material in order not to appear to be dictating to the dentist what procedures, if any, should be followed in the treatment in any given case. It will be noted in the letter to the dentist that he is informed that a written copy of the examiner's diagnosis and recommendations will be sent him but only on his initiative. The triplicate is for the employer to use in the follow-up program.

The actual charting of the examiner's findings is done by a trained dental assistant employed by the Committee. About five minutes is consumed in completing this phase of the service. An additional five minutes is then given to discuss with the employee, in an informal manner, his dental conditions. Where indicated, charts, graphs, and models, in addition to the roentgenograms are used by the examiner, to visualize for the patient certain mouth conditions and to impress on him in a graphic way the consequences of continued neglect.

When the dentist has completed his examination and educational talk he asks the employee for permission to mail the roentgenograms to his dentist and confer upon him (the employee's dentist) authority to make an appointment actually to begin treatment. It is at this point that the greatest barrier to the seeking of dental service; viz. procrastination, is overcome. A copy of a booklet on

the care of the teeth is given to the employee, with the admonition to be sure that in addition to himself, the members of his family read it and follow the advice it offers. The employee is then dismissed and the examiner smilingly advises him that he will be interested in the follow-up program to ascertain how well he (employee) has progressed. When the last employee for the day has been examined, the assistant mails all the identification slips and roentgenograms to the dentists whose names were given by the various employees. The same procedure is followed daily until all the employees of the company have been examined and referred to their dentists for treatment. To complete the cycle of service all that is required of the dentist is that he call the employee immediately upon the receipt of the material.

Local Sponsorship

This plan, the Industrial Diagnostic Service, is developed exclusively for the use of local component units of the American Dental Association. To such groups the Chicago Dental Society gladly offers its full cooperation in the establishment of this service in any community.

The most satisfactory method of administration is through the medium of a committee appointed by the society president. In most communities a committee of five or six members is adequate and will provide the most efficient size. Such a committee should have as members men who have definitely revealed an interest in public relations and dental economics. These two points of view must be represented on any Industrial Diagnostic Service Committee. In addition, there should be at least two members capable of presenting the program to an employer; in effect, someone with broad experience who can talk to the average employer or industrial executive in his own language. The body of the society having executive control of its affairs should likewise have representation. Under an energetic and enthusiastic chairman such a committee should function with complete satisfaction.

Advantages of Service

To some it may appear superfluous to incorporate in this article a section enumerating the advantages and benefits of the operation of the Industrial Diagnostic Service; nevertheless, for purposes of clarity, it is considered desirable to list the beneficiaries of this service and the immediate benefits that inevitably accrue to them.

1. *Dental Profession*—The dental profession gains by having placed in the chairs of dentists, persons requiring dental service who definitely have incomes and are thus presumed to be able to buy some dentistry.

2. *Employees* — Experience has demonstrated that only a small proportion of employed persons seek regular dental service. Experience has likewise shown that the vast majority fail to seek regular care largely because of procrastination and ignorance as to the ultimate consequences of dental neglect. This program shows the employee by visual means (the roentgenogram) the havoc that has already been wrought *in his own mouth* by failing to seek dental treatment. Consequently, each affected employee is more than anxious to visit his dentist and have the necessary work done. The net result is a happier, healthier, and therefore, a more efficient group of employees.

3. *Empoyer*—It is aximomatic that employee efficiency depends primarily on employee health. Everything else being equal, the curve of employee efficiency will parallel closely the health curve. This being the case, enlightened management is taking an increasingly greater interest in employee health. Healthy, happy employees produce better financial returns, not solely to themselves, but to the management and larger dividends to stockholders.

4. *Dental Dealers, Manufacturers and Laboratories*—Obviously, a substantial increase in dental practice in any given community will increase the volume of business of those engaged in the dental trades.

Financing of Service

It is apparent on the basis of cost figures presented that considerable capital is required to operate this service on a substantial scale. As a result the financing problem looms large. Several practical methods of solution are suggested for the consideration of the reader and are enumerated as follows: (1) by the society directly from the treasury; (2) by the society on subscription of the membership; (3) by the society on special assessment of the membership; (4) by the society from the sale of advertising space in its official publication, the net revenue only to be used; (5) by the society with the financial support of the dental dealers, manufacturers, and laboratories; (6) by the society on a division of expenses with the employer; (7) by the employer alone.

If suggestion 6 or 7 is selected the society is advised to check the state dental practice act to be certain no violation of that act occurs.

Approach to Employer

Regardless of the merits apparent to every dentist, the average employer will have to be "sold" on this program for his organization. While many employers have a social point of view and are anxious to further the health and welfare of their employees, others can only be interested strictly on a dollars-and-cents basis. It is for presentation to the latter group of employers that the following suggestions are made:

1. An intelligent employer is open to a proposition that will increase the efficiency of his employees and thus fatten his profit. This is the basis of the argument. Upon acceptance of this premise the importance of health should be stressed. The next point is the relationship between a healthy mouth and the general health of the body.

2. The second important argument is the opportunity offered by the Industrial Diagnostic Service to build employee good will for the employer. Naturally, the better the approach to the employer, the more sympathetic will be the hearing and the quicker a favorable conclusion will be reached. For this reason, it is suggested that the identities of the dentists of industrial executives be learned. Obviously, if the dentist of an employer actively cooperates in an effort to secure the necessary consent to the service, the task will be easier. This is a practical suggestion that lends itself to adoption in any community, but particularly is it effective in a large city.

Examining Dentists

Every dentist selected to examine employees under this service must possess two basic requisities: First, he must be a competent diagnostician with a better than average experience in the interpretation of dental roentgenograms, and second, he must have a pleasing personality, of the type that immediately inspire confidence on the part of the person being examined. Too much stress cannot be laid on the necessity for the selection of properly qualified dentists for this work. Experience has demonstrated that it is the examining dentist on whom the success or failure of the program rests. An alert, intelligent, and sympathetic examiner can be the strongest single factor in the success of this program. Likewise, a matter-of-fact, disinterested, and undiplomatic examiner can be the cause of failure of the service.

For purposes of efficiency, it is suggested that a minimum number of examiners be used. The reasoning behind this statement is that "practice makes perfect," which, though platitudinous, seems to be true. The more experienced and capable the examin-

Form Letters

1. (*To be sent to the dentist who is receiving his first patient as a result of this service.*)

Dear Doctor:

Enclosed you will find dental roentgenograms and a statement of general information pertaining to the person whose name is given and who states that you are his dentist. All the employees of the company with which this person is connected were given thorough mouth examinations through the facilities of the Industrial Diagnostic Service Committee. The purpose of this service is to acquaint employed persons with the value of regular dental care and refer them to their own dentists for treatment.

In the course of the examination of this patient permission was secured to mail the enclosed material to you and authority obtained for you to call this patient for a definite appointment to begin treatment. In fact, it is the expressed wish of the patient that you do so.

The Society, in referring employed persons to their own dentists, believes that it is rendering a beneficial public service which, at the same time, reacts to the economic advantage of the dental profession. The profession can best cooperate by (1) calling the patient for an appointment *immediately;* (2) by adjustment of dental service and fees therefor that will be commensurate with the ability of the patient to pay. On this second point we plead for the cooperation of the profession.

If this patient is already under treatment by you, it will not be necessary to call for an appointment. Incidentally, should you desire a copy of the examiner's detailed roentgenographic and clinical record, kindly notify the office of the Chicago Dental Society, either by letter or phone, and it will be forwarded to you promptly.

In conclusion, we should like to point out that this program has been conceived and placed into operation for the benefit of all concerned, and only through the complete cooperation of all will it succeed. The constructive criticisms and suggestions of the profession are invited.

Sincerely yours,

Chairman, Industrial Diagnostic Service Committee

P. S. As soon as the patient has kept his first appointment with you, kindly sign and return the enclosed post card.

Form Letters

2. (*To be sent to the dentist with records of all patients after the first.*)

Dear Doctor:

Enclosed you will find dental roentgenograms and a statement of general information pertaining to the person whose name is given and who states that you are his dentist. Since our records indicate that one or more patients have been directed to you previously, as a result of this service, it is not necessary to go into detail. In the course of the examination of this patient permission was secured to mail the enclosed material to you and authority obtained for you to call this patient for a definite appointment to begin treatment. In fact, it is the expressed wish of the patient that you do so.

Your continued cooperation in this effort will be greatly appreciated.

Sincerely yours,

Chairman, Industrial Diagnostic Service Committee

P. S. As soon as the patient has kept his first appointment with you, kindly sign and return the enclosed post card.

ers, the less will be the cost per examination. This is vital, particularly when the examiners are receiving compensation.

The development of a staff of examiners should be at the initiative and invitation of the committee. Under no circumstances should the committee issue a general call for volunteer examiners. A volunteer expects to be put to work and failing in this is apt to place the committee in an awkward position. The committee should develop a list of men who in its judgment would make competent examiners. Individual solicitation should then follow. The number of examiners required will, of course, depend on local conditions, although the smaller the staff the better for the service. It is recommended also, that one of the examiners hold an M.D. as well as a D.D.S. degree, thus enabling him to act as a consultant on questionable pathologic oral lesions which may be uncovered. This permits the other dental examiners to refer doubtful cases to him for verification of the diagnosis.

185 North Wabash Avenue.

Complaints of Dentists Regarding Roentgenologic Service

The sponsors of this program in any society may be required to answer the complaint that the taking of complete dental roentgenograms without charge to the employees is subversive of roentgenologic practice. This complaint is more apt to be made by dentists possessing x-ray equipment, particularly those engaged in the field of oral surgery and exodontia. The argument, which sounds logical enough, is that those examined, by virtue of the fact that they are gainfully employed, should pay for roentgenographic service. This being the case, for every employee examined some dentist is deprived of a just and proper fee. The fallacy of the argument lies in the presumption that each examined employee, prior to examination, contemplated the purchase of a complete dental roentgenogram. Nothing could be further from the case. As a matter of fact, of 215 employees examined at the Chicago plant of Standard Brands, Inc. (a typical plant employing all classes) only twenty-six or 12.5 per cent had ever availed themselves of dental roentgenographic service.

To say that this was an active market for the purchase of dental roentgenograms is exaggerating to say the least. The justification for the use of roentgenograms can be summed up in four short statements: (1) The examiner is enabled to make a *complete* examination; (2) the roentgenogram is an invaluable aid in showing the employee visually his own mouth conditions and thus convinces him of the necessity for immediate dental service; (3) the employee having been impressed with the necessity of a roentgenogram in making a complete examination can be expected to seek roentgenographic service at the hands of his own dentist at regular intervals in the future; (4) the examined employee can be expected to educate his own family and possibly some of his friends to the value of the dental roentgenogram.

It can readily be seen that the Industrial Diagnostic Service effectively educates employed persons to the value of regular roentgenographic examinations of the teeth and supporting structures and in the commercial vernacular, makes them "x-ray conscious." This is a state of affairs highly desired by every dentist.

(*End of First Installment*)

PRESENTING BITE-WING TECHNIQUE
IN LINE DRAWINGS

HOWARD R. RAPER, D.D.S.
Albuquerque, New Mexico

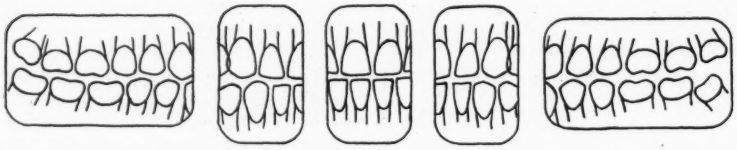


Fig. 1—Showing how the teeth are distributed in the various negatives in a 5-film bite-wing examination.

The bite-wing packets required for the basic 5-film examination are as follows: Three Type 1 packets for the anterior region, and two Type 3 packets for the posterior regions. For a 7-film examination, use four Type 2 packets for the posterior regions.)

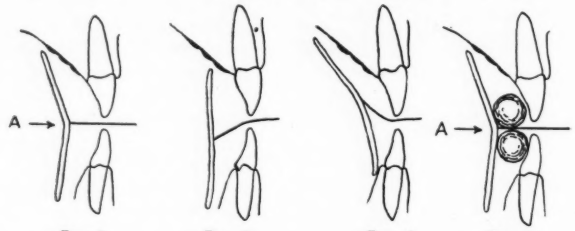


Fig. 2 Fig. 3 Fig. 4 Fig. 5

Placing Anterior Packets. Before the packet is placed in the mouth, kink it so it will bend in the middle as shown by the arrow, A. **Fig. 2** Have the patient bite "end to end."

CAUTION: Do not pull on the bite-wing in an effort to bring the face of the packet in tight contact with the teeth; it is not necessary and may cause discomfort and distortion of the image.

With the teeth biting end-to-end, there will be spaces through which the operator may look to make sure the bite-wing is horizontal; i.e., **not** slipped down or up as in Figs. 3 and 4.

Figs. 3 and 4—Packet slipped down too low in Fig. 3, and up too high in Fig. 4. Kinking the packet (arrow A in Fig. 2) tends to prevent these errors.

Fig. 5—In V-shaped arches, or in other cases also if the operator desires, cotton rolls may be placed on the face of the packet above and below the bite-wing, as illustrated here. This makes placing the packet easier and tends to keep it in proper location.

Fig. 6—Packet correctly located for the lateral incisor region; mesial edge of bite-wing at median line.

TECHNIQUE: Place packet as for central incisor region; have patient bite, but not tightly. Shift to distal, until mesial edge of bite-wing reaches median line. Now have patient bite tightly.

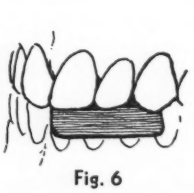


Fig. 6

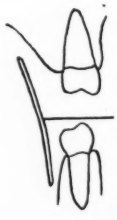


Fig. 7

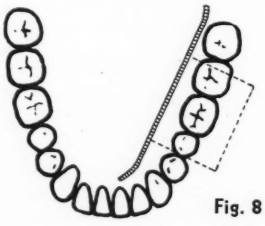


Fig. 8

Placing Posterior Packets. Fig. 7 and 8—Before the packet is placed in the mouth, bend all corners, but especially the two front ones. Place in position for the lower teeth, as shown in Fig. 7. Let the upper part of the packet slant inward so that it will slide into the palatal vault as the mouth is closed. This slant is illustrated in Fig. 7. Let the anterior edge of the packet come well forward into the anterior region, as in Fig. 8. There will be a space between the face of the packet and the lingual surface of the teeth in the cuspid-bicuspid region. Do not pull on the bite-wing to close it. Have the patient bite slowly, in normal occlusion, not end-to-end.

EXCEPTION: After the operator has had considerable experience and has mastered the essentials in technique, he may then, if he desires, pull on the bite-wing to bring the face of the film closer to the crowns of the teeth, in the posterior regions, **not** the anterior regions. Technique: Place packet as described. Have patient bite **gently**. Pull on bite-wing, then have patient bite tightly.

403 First National Bank Building.

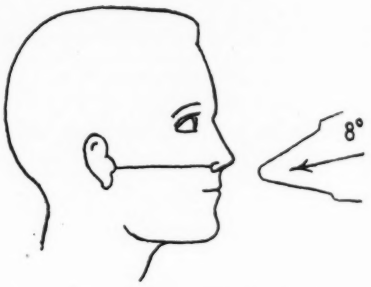


Fig. 9—The head position should be the same for all regions; i.e., occlusal plane of upper teeth, horizontal, as indicated by the horizontal line from **tragus-to-ala** shown here.

VERTICAL ANGLE: The same for all regions; namely, about 8 degrees above the horizontal, as shown in Fig. 9.

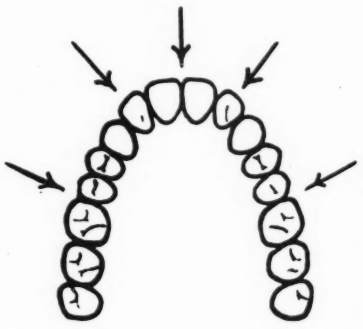


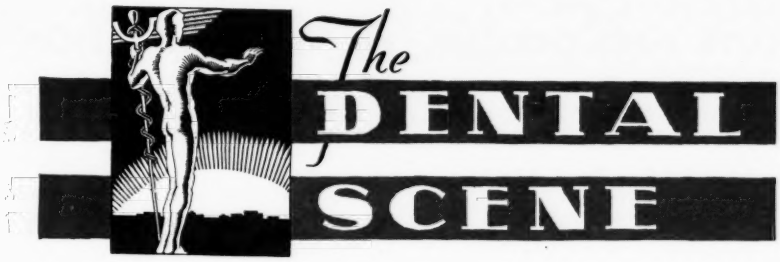
Fig. 10—The arrows indicate the correct horizontal angle for the various regions of the 5-film bite-wing examination.

EXPOSURE: One-half as much for the anterior regions as for the posterior. With a regular dental unit, using Eastman Bite-Wing Films, about 6 seconds for the posterior regions, 3 seconds for the anterior regions.

DEVELOPMENT: Same as for all other dental x-ray films; i.e., 5 minutes in fresh developer at 65° F.

MOUNTS: Bite-wing negatives should be mounted so that they may be viewed in their correct anatomic relation to one another. Use a good, even transilluminating light.

BITE-WING PACKET SIZES: Bite-wing packets are made in four sizes as follows: Type 1: Small, for anterior regions; Type 2: Intermediate, for posterior regions; Type 3: Large, for posterior regions; Type 0: Special, for posterior regions of the mouths of children.



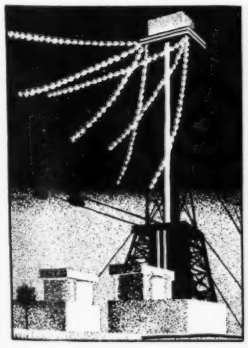
SOMEONE has suggested that it would be doing visiting dentists to A Century of Progress Exposition a good turn to point out what to shun. Differences in taste, of course, defeat the undertaking at the outset. But it is my feeling that too many dismiss too much without investigation. "Oh, it can't be very good," they say, and thus skip a delightful detail or a pleasurable view. For that reason, it is a good plan to go to the Fair, at least once, independently and alone, to see what unwilling companions reject without seeing. There is, after all, a satisfaction in having first-hand information on which to pass even a derogatory opinion of one's own. One should not attempt to visit the Fair in the weary attitude of American tourists in Vienna who "domestic as a plate . . . retire at half past eight." The days are apt to be hot. The sun reflects back from the many white buildings on Chicago's "made land." Dark glasses are imperative and the "blind beggar" suggestion at every turn may be as annoying as the actual and inevitable "come-ons." The days are better spent in examining indoor exhibits,[1] where science is taken for granted in 1934. It does not flaunt its progress; it is not insistent as in the 1933 version, though it is often objectively the same. Science is there as definitely this year, but its manner is subdued. It sits in dignified certainty of appreciation.

At the softening twilight hour when Lake Michigan breezes begin to fan the "domain of wonders" and electric-color-daring lights the way, one should come alert for pleasant encounters and should not be too squeamish about possible unpleasant ones, for the realistic appeal is occasionally sought by way of the nostrils. But on the whole (one cannot resist drawing comparisons and pointing differences), A Century of Progress Exposition of 1934 is less hectic, more harmonious in its grouping of color schemes. It is not so different as it is more complete than in 1933. There are more oases of calm in the glitter and clatter, more splendor than splash, more sound than fury: shaded benches, flower and tree bordered lawns and gardens, pools and fountains, village greens, the Lagoon Circus Theater, lovelier gardens in the Horticultural Exhibit, the Lagoon Fountain, the lagoon itself —and music: free open air recitals, bands, and concerts (The Detroit Symphony Orchestra in the Ford Gardens and the Chicago Symphony Orchestra in the Swift Bridge "shell" theater). A few hours ago I sat listening to the concert in the modernistic Swift Press Lounge atop the Century Grill, overlooking the orchestra and open air theater below, and beyond the startling borders of the lagoon. The Swift Bridge is one of the improvements and innovations of the present Exposition, combining the cultural and practical with no disturbing effect.

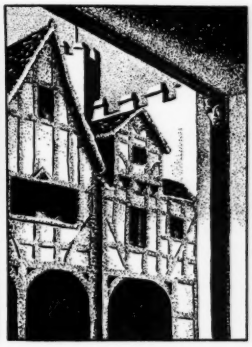
"Picturesque Belgium," a favorite of last year, holds its own: It has become somewhat weatherbeaten, with a look of antiquity—a decided advantage alongside the *newness* of the 1934 villages, which require some explanation. The new villages have been accused of imitating the Belgian idea, and the hurried construction of two or three of them seems to confirm the accusation. Somehow the Old World charm is not always captured. But a recent reading of Henry Justin Smith's CHICAGO, published in 1931, tells of the plans for "a group of buildings entitled 'Old Europe.'" Instead of a group striving to be typical of each and all the nations, the countries have chosen to be individually represented by villages. These, by the way, are not all foreign, for the Colonial Village is in the grouping as well as the Bowery. Do not expect Mount Vernon to be Mount Vernon, the Potomac and all; and if you imagine a village hidden in a forest of dark trees, as I did, you will be disappointed in the Black Forest Village; but go at night—the darkness and clever lighting will aid the illusion, particularly will it help the stage-setting mountains. This is true of the Swiss Village, too. It is a mistake to rush through the villages and say, "There's nothing there but some old architecture." Sit a while in their atmosphere; partake of the native food offering; watch the floor shows of native (or modern) performers; and especially, notice the details that the planners took pains to place there and explain.

Would you go to England and shun London? Then, why go to Merrie England and not visit the charming Globe Theatre, where for an hour excellent actors perform gayly in popular cuttings of Shakespearean comedies. Cross over to the Shakespeare House, if you are not going to Stratford on Avon very soon.

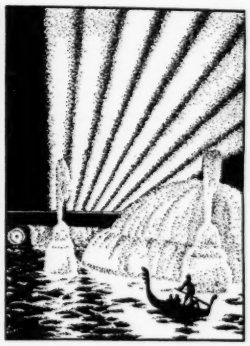
(*Continued on page* 245)



Suspended stars link the Skyride's towers.



The gabled roofs, the arcaded terraces of the villages.



The beamed background, the mirrored floor, the lambent enkindled form — of water and electricitys and color made.

[1] The Dental Exhibition the Hall of Science, at A Century of Progress was described in THE DENTAL DIGEST 39:243 (June) 1933, and again, in an article by Arthur D. Black, D. D. S., M. D., in the May, 1934, issue of this magazine.

ACUTE AND CHRONIC VINCENT'S INFECTION

REPORT OF CASE

EDWARD L. BALL, D.D.S.
Cincinnati

THE patient, a well nourished man, aged 29, complained chiefly of "a very sore mouth."

History—The patient noticed recession of the gums around the right upper central incisor in 1931. In April, 1933, the patient had an acute attack of Vincent's infection. Treatment seemed to control local symptoms. Early in the summer of the same year, the patient had another acute attack, and local treatment again gave relief.

August 29, 1933, the patient was ill and presented at our office with a badly diseased mouth.

Symptoms—At the time of examination the following acute symptoms were present: ulcerative gingivitis around all the teeth; extreme pain; marked submaxillary swelling (bilateral); the salivary glands were very active and the saliva had a metallic taste; typical bad odor; loss of weight, sleep, and appetite; slight elevation of temperature, and nervousness. The patient was an excessive smoker.

Treatment—Irrigations of hydrogen dioxide with an air spray, and the Adam's treatment (Churchill's iodine, and silver nitrate, 10 per cent) were instituted.

Home Care—Written instructions for home care were as follows: (1) Hydrogen dioxide (full strength) mouthwash to be used every two hours; (2) four large glasses of orange juice to be taken daily; (3) aspirin (acetylsalicylic acid); (4) cathartic (milk of magnesia); (5) rest in bed; (6) boil dishes, and (7) no smoking.

Course—After five office visits within a week, the acute symptoms had all subsided; even the enlarged submaxillary glands were apparently normal.

The patient went away on a week's fishing trip and when he returned, a slight acute attack of Vincent's infection was evident. This responded quickly to treatment. The patient was then ready and anxious for surgical intervention.

547 Doctors Building.

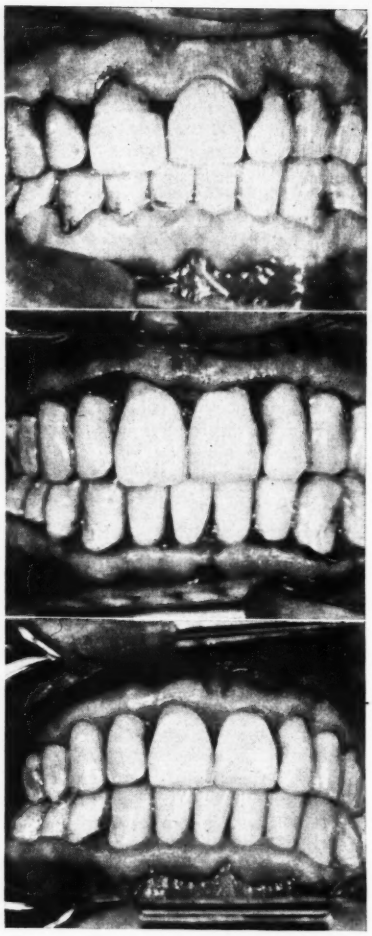


Fig. 1—(top) Photograph taken after acute symptoms had subsided. The interproximal papillae were not connected. Note swollen gingival margin especially around the lower anteriors.

Fig. 2—(center) Photograph taken immediately after surgical dressing was removed which was ten days after debridement. Note depth of pockets around the upper lateral incisors.

Fig. 3—(bottom) Photograph taken six weeks after surgical treatment. Note the connected interproximal papillae.

A complete roentgenologic survey of the mouth, including the use of bite-wing films, was made, and a photograph was taken (Fig. 1).

Diagnosis—A diagnosis of chronic Vincent's infection was made based on a study of the roentgenograms and the clinical observations, together with the history of recurrent attacks.

Extraction of the right lower third molar and surgical elimination of the chronically diseased gum tissue was suggested.

Surgical Treatment—The Ward-Kaiser technique was used. Irrigations were given every other day for ten days until the surgical dressings were removed and another picture was taken (Fig. 2).

Postoperative Treatment—The occlusion was balanced, and a thorough prophylaxis was given. The patient was instructed in the proper use of toothbrushes, toothpicks, dental tape, and mouthwashes.

Duration of Treatment—The case consumed eleven hours' office time from the first visit until the patient was dismissed.

Conclusion

In Doctor Arthur Merrit's[1] complete and excellent paper on Vincent's infection, he says,

> The point that I especially want to make in my paper is that the establishment of good hygiene in the mouth at the earliest possible moment represents the first principle in the treatment of Vincent's Infection. When this is followed by the use of oxidizing agents, few if any cases fail to make a rapid recovery.

In this débridement described in the present article, I believe I have prepared the mouth to accept good hygiene and if the patient follows instructions as to daily home care and has the necessary restorations made, permanent recovery will be assured.

1 Merritt, Arthur: Vincent Infection: Etiology, Diagnosis, And Treatment, J. Dent. Research 13:51 (February) 1933.

The Editor's Page

WHETHER the present discussion on a planned national economy will die the quick death of Technocracy or will continue to grow is a matter of more than passing interest. The present quasi-socialistic teachings and ideals will no doubt be retarded when the economic recovery gets under way, when the tax bills are computed, and when the novelty and popularity of the teachings and the teachers wane. At present big business and capitalism are meekly quiet as they tread the present precarious economic ground; as soon as business begins to flow and profits increase, the independent spirit of big business will again show itself. Babbitt and the blatant business barons will return, and capitalism will have another chance in the American National Economy.

Let us grant that capitalism will have another chance. Does that mean that private dental practice, for example, will be assured? There is not an accurate parallel between capitalism and private practice. Capitalism has money, power, and influence to mold the opinions of legislators and the sentiment of the public. Capitalism directly by the system of inadequate wages and unassured employment makes it difficult for people to purchase our services. Capitalism, indirectly, through the endowments of the so-called philanthropic Funds and Foundations, is undermining private practice. Furthermore, in a new kind of capitalistic state we may expect capitalism to make certain concessions that will appear magnanimous. Although groups of employers may oppose unemployment insurance, old age pension, health insurance—they will most likely concede these changes as a bargaining wedge to guarantee profits. We see, therefore, that the preservation of capitalism does not necessarily mean the preservation of the values of private practice.

It is conceivable, moreover, that the dental and medical profession will be gripped in a vise between capitalism and socialism. On one side is capitalism conceding social insurance to the people as a sedative; on the other side is socialism clamoring for social insurance as a partial panacea. Caught in between will be the people who stand to gain from social insurance, and the professions who stand to gain a bit or lose all. Whether we take our little gain or suffer our great loss is for us to decide. We, and we alone, can save ourselves.

The change from the more or less innocent organization of dental care for the indigent, unemployed, through voluntary and compulsory health insurance, to the ultimate frank and complete State dentistry may appear to be a preposterous and far-fetched prophecy. Under ordinary historical conditions such an evolutionary change would probably be slow and take many years. But today the tempo of change is swift. Anything may happen in the present social and economic order: The mechanism of supplying dental care once subsidized by governmental funds might not stop short of actual socialization.

Under national planning or under a system of national health insurance, inherent dangers still exist; nevertheless, we cannot nor should we even attempt to stop these present economic and social forces, because they do carry with them some elements of good. But, we insist, we must have a voice and a hand in the planning. We must raise our voices high and our hands must be strong; for alined against us will be commercial interests, demagogues, social theorists, reformers, and opportunists, and a few heretics within our ranks.

We should particularly fear the demagogue. No field of social life offers a better opportunity for demagogic appeal than the field of medical care. Sickness is something that every family knows. The financial stress and strain of prolonged illness upsets the economic mechanism of almost any family. The hardships and privations of ill health are subject to dramatic and emotional appeal. If some demagogue should arise in our industrial and agricultural communities and promise free and unlimited medical care and facilities, he would receive more than passing acclaim.

A pertinent utterance has come out of England. These thoughts were expressed, not in 1934 nor during the Lusty '20's, but in 1857; they are not the words of a dentist, but were written by Lord Macaulay to H. S. Randall, a citizen of the state of New York:

> The day will come when a multitude of people, none of whom has had more than half a breakfast or expects more than half a dinner will elect a legislature. On the one side is a statesman, preaching patience and strict observance of public faith; on the other side a demagogue ranting about the tyranny of capitalists and asking why anybody should be permitted to drink champagne and to ride in a carriage while thousands of honest folk are in want of

(*Continued on page* 239)

CLEANING THE TEETH

W. F. SPIES, D.D.S.
New York

CLEANING the teeth is a mechanical process. Mechanical methods, rightly used, keep the teeth clean without destruction of tissues. Wrongly used, they irritate the soft tissues and wear away the teeth.

The purpose of this article is to show that a difference exists in cleansing bases used in dentifrices in both paste and powder form; that mineral bases contain crystals that differ in size, shape, and hardness; that the degree of abrasive or cutting action is determined by the hardness and shape of the crystals; that if these crystals are hard, sharp-edged, and coarse, the amount of brushing usually given teeth in cleaning will, in time, irritate the gum tissue and abrade the teeth while cleaning the surfaces of the teeth; that as these crystals are reduced in size, such as into an impalpable powder or combined with other agents, such as soap, the cleansing power is reduced to a minimum; that if one could produce a substance of such shape and hardness that would clean the surfaces of the teeth without abrasion or irritation of the soft tissues during a long period of use, he would have gone far toward producing the ideal cleansing material.

The idea of abrading or wearing away the teeth by the use of dentifrices is not new. Miller in 1907 stated:

> Taking it all in all I have come to the conclusion that we have formulated our question regarding wasting of teeth wrongly. It should not be, Why do some people have it, but, Why do not more people suffer from it? I was surprised to find even precipitated chalk wore the dentine away rapidly, but this one can understand in view of the fact that the substance consists of a mass of fine crystals, which although they are very small, are still sharp, and sufficiently hard to abrade dentine.

Thomssen states, "Sharp abrasives are very well for false teeth which can readily be replaced but natural teeth deserve better treatment."

Ferrier[1] writes, It is the sharp wedge-shaped areas occupying the gingival third of the teeth that are of interest here, because of the frequency of their appearance in the best kept mouths. The etiology of this type is clear . . . The frequency of occurrence of erosion is alarming, deserving more consideration than it has in the past received. It occurs only in well-cared for mouths. (I have never observed it in an ill-kept or neglected mouth.—Ferrier) I do not wish to cause confusion by changing a nomenclature that has been used for many years; but, to be exact the condition that I refer to might better be classed as abrasion.

It is interesting to note that the harsh, crystalline matter in so fine a powder as that used on the face is recognized as an irritant to the facial tissues.

For a number of years my practice has been largely devoted to prophylactic treatment. Such a practice may have made me more alert to the disasters that threaten the teeth and soft tissues in numerous cases unless the methods of home cleaning of the teeth in general use are radically changed. My experimental work and clinical observation of cases of abrasion or wearing away of the teeth, and irritation and recession of the gums started in 1915, and was prompted by the question of so many patients with gums known to be free from disease, "Why do my gums recede, teeth become sensitive, and little grooves form in my teeth, when I give them the best of attention by brushing them and going to my dentist?" I was struck by the fact that not only did such questions come for the most part from intelligent and attentive patients, but that in the mouths in which there was no disease and the teeth were brushed several times daily, there occurred a continuous, progressive recession of gum tissue for which no treatment was effective.

In these mouths there were no deposits to cause recession of gum tissue, the gums were healthy, the mouths clean, and there was no indication of systemic disease. With this knowledge it seems as if it has been put up directly to the dental profession to review its technique and find out whether or not it is powerless to overcome these conditions in the mouths of those patients who lent themselves willingly and intelligently to its ministrations. If the recession of the gums and the abrasion of the teeth increased in direct proportion to the patients who were diligent in home toothbrushing, it seemed that there must be some destructive action of the dentifrices that these patients were in the habit of using. Probably seven out of ten patients that present for prophylactic treatment yield one or more of these conditions of one or more teeth. The study of these extreme cases naturally led to the search for the initial condition in other mouths. The initial symptom was found to be a slight recession of the gums at the gingival margin or neck of the tooth. The second symptom is the beginning of abrasion or wearing away of the tooth structure. The third symptom is the extreme sensitiveness in many cases, such as would be produced by the wearing effect of a clasp. The extreme condition is only an aggravation of these early conditions.

The first step in seeking to answer questions by patients was to inquire as to the frequency and manner of brushing the teeth and the materials used. It did not take long to ascertain that the direction of the brushing movement was not such as to account for the irritation that produced the recession. Only a little further study was required to eliminate the brush itself as the cause of the irritation with the exception of the cases in which very stiff brushes were employed. The question was thus narrowed to the materials that the patients were using with the brush. These were the dentifrices generally prescribed by dentists.

Abrasion of the Teeth

Abrasion may be classed as a slow form of grinding. The ordinary stones used in crown or inlay preparation and grinding down porcelain teeth may be used as examples of more rapid grinding. These stones are composed of crystals of different sizes and hardness, depending on what they are to accomplish, held together by a binder. As the binder wears down, the edges of the crystals project. Because the crystals are usually larger in size, hard, and sharp-edged, and in swift motion, they cut rapidly. Abrasion is a form of grinding in which the crystals are comparatively small, under light pressure, are in relatively slow motion, and are used intermittently. Under such conditions

1 Ferrier, W. I.: Clinical Observations on Areas of Erosion and Their Restoration, J. A. D. A. 20: 1150 (July) 1933.

Figs. 1 and 2—Two views of the same tooth. Note results of abrasive action at the junction of enamel and cementum.

Figs. 3 and 4—Specimens mounted in comparative brushing experiment.

a long time often elapses before destructive action is noted. But given the small, sharp-edged crystals the slow motion, and intermittent use for a long time, irritation of the gum tissue, sensitiveness, and destructive grinding of the hard tissues of the teeth invariably results.

The first effect of the application of abrasive crystals to the teeth is irritation of the soft tissue of the gums, followed by recession. The next effect is seen on the cementum exposed by the recession, because the greater density of the enamel and its rounding form throw the greater portion of the bristles of the brush and greater part of the dentifrice onto the cementum. Because the cementum is soft as compared to the enamel, the abrasion is more quickly effective on it. But if the use of the abrasive crystals is continued for a sufficient time the results of their action on the enamel may be seen.

Figs. 1 and 2 are two views of the same tooth. Note the results of abrasive action at the junction of enamel and cementum, more clearly shown in Fig. 2. This condition was present in the mouth and was photographed shortly after extraction.

The Abrasive Effect of Mineral Crystals on Extracted Teeth

Laboratory experiments were conducted to determine comparatively the effect of the toothbrush and water on tooth structure; second, the abrasive effect of the materials used in the manufacture of dentifrices both paste and powder with the toothbrush and water; third, the abrasive effect of dentifrices purchased in the open market. Clinical investigations were made to determine the relationship of abrasive action to the recession of gum tissue in normal and healthy mouths. These examinations were recorded on a chart.

Preliminary Consideration in the Comparative Laboratory Brushing Experiments

Several matters had to be taken into consideration before the comparative laboratory experiments were attempted. One of these was the amount of force used by patients in brushing their teeth. Some plan had to be evolved whereby the amount of force used could be obtained as accurately as possible in a large number of cases. This is an important phase of the work because a difference in the force or pressure would make a significant difference in the cutting action. Patients were instructed to brush on the top of a parcel post scale in order to determine the amount of force used. They were instructed to use as nearly as possible the same degree of force as they would in their daily brushing. The amount of this force would be registered in ounces on the dial of the scale. The patients examined were asked to repeat this operation a number of times in order to avoid errors and insure greater accuracy. The same patient might show a varying degree of pressure so that an average was made of the various brushings. Then an average was struck with these pressures; for example, the first brushing would show a pressure of 6 ounces, the second, 7 ounces; the third, 8 ounces, and the average would then be 7 ounces. Further groupings were made of the several classes, such as 6, 8, 10, and 12 ounces. The same type of brush was used in all experiments.

A second important consideration was the development and building of a machine with which to do the comparative brushing experiments. It can readily be seen that to do a considerable amount of brushing by hand would doubtless become tiresome and would not give equal pressure and altogether accurate results. For this reason a machine was built, so that all experiments could be conducted under the same conditions. By the use of a

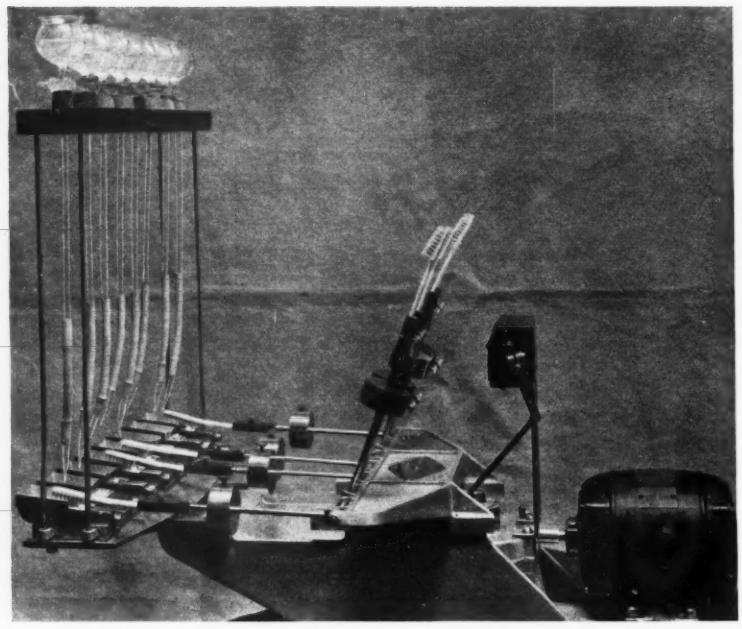
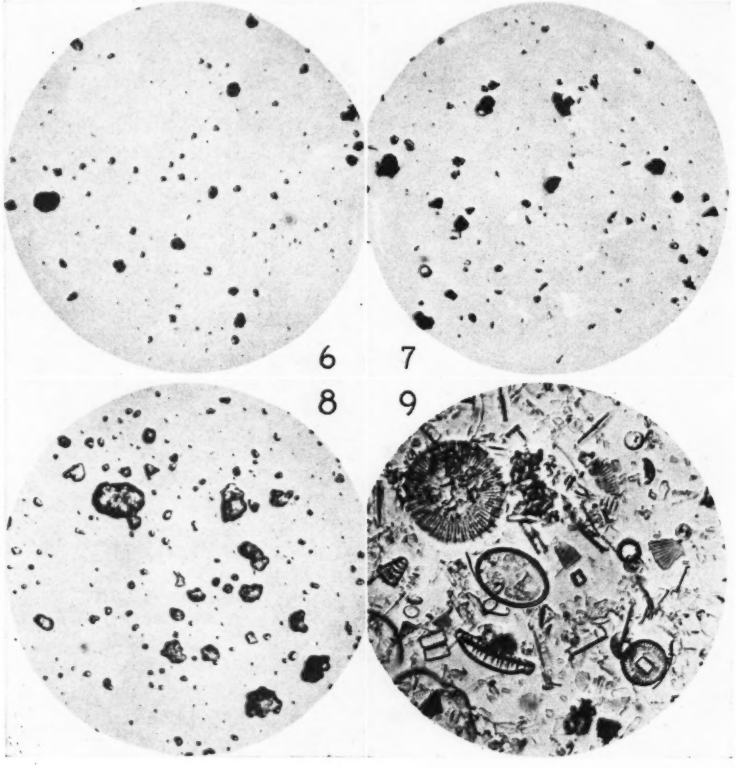


Fig. 5—Machine used in comparative brushing experiments.

machine a number of specimens could be brushed at the same time. Speed could also be controlled. The loose arms of the machine with the brush on the end permits free action, and at the same time makes allowance for the change of the weights to change the amount of pressure at the end of the brush. The number of times the bristles of the brush passes completely over the tooth is recorded on a ratchet counter.



Figs. 6, 7, 8, 9, and 10—Crystals found in the various cleansing bases in dentifrices.

A third consideration was that dealing with the amount of brushing or the number of times the brush passes over a given tooth in the actual brushing operation at home. Of course, it must be understood that only an estimate can be made. From investigations it was decided that on the average, a toothbrush would pass over a given tooth twenty-four times each day, twelve times during a brushing or six double strokes. On this basis a patient would use 4,380 double strokes a year; two years, 8,760; three years, 13,140. The basis for most of these experiments were for a period of three years.

Description of Brushing Machine

The machine consists of a cast aluminum base to which is attached a motor. To the shaft of the motor is attached a movable joint. This arm is marked at certain points where the weight can be placed so as to give a definite weight or pressure at the end of the brush. As an example, the weight placed at the nearest mark to the machine would be 6 ounces at the end of the brush; second mark, 8 ounces; third mark, 10 ounces, and fourth mark, 12 ounces. Each arm or brush travels in a definite path. The mounted specimens are held in position by thumb screws. Each specimen is mounted so that it extends about one-eighth inch above the surface of the plate. There is a small cup at the end of this plate to hold the material that is being used in the experiment. There is a standard attachment to this plate which holds a number of barrettes for the use of water in definite quantities. From these barrettes a small hose leads to each specimen and at intervals water drops to the specimen. This quantity of water is the same in each instance.

Specimens Used

Care was exercised in the selection of specimens. In securing these speci-

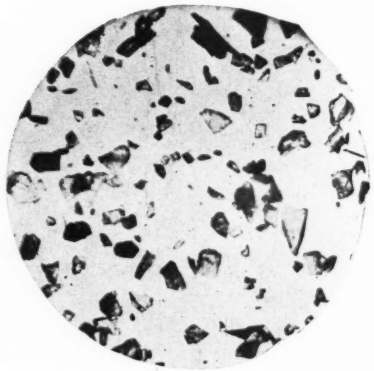


Fig. 10

mens the date of extraction, age of patient, and the sex were obtained. Each specimen was carefully examined by a high-power magnifying glass for any defects before it was used. The specimens were given a definite number and placed in test tubes in antiseptic solutions. As these specimens were needed they were photographed in groups. A form was made for each lot photographed. The number of the tooth was recorded on this form and in the same position that the tooth occupies in the photograph. The photography was done before and after each experiment, in two positions, a front and side view. The specimens included different types of teeth.

Mounting Specimens

Each specimen was mounted in a small rectangular frame which contained sealing wax. The root was covered with sheet gutta-percha to take the place of gum tissue and approach the condition in which the tooth would be found in the mouth. This was done in the belief that the bristles of the brush in the act of brushing find their way to the V-shaped space at the junction of the enamel and gum tissues. These specimens were mounted on the plate so that there was no chance for the contamination of materials. A definite quantity of each material was weighed for each experiment. Many experiments were conducted but all the teeth used were from the same mouth in order to overcome the possibility that there might be some difference in the resistance of the teeth from different mouths to the toothbrush and material used with it.

In each experiment a control was used. This control tooth was given the same amount of brushing and water but no material was used. This was done in order to determine whether the toothbrush and water had any effect in the brushing. From the experiments it can definitely be stated that the toothbrush and water alone had no effect in the way of abrading the teeth.

Materials Used in Dentifrices

In order to gain a better understanding of the materials that are used in the manufacture of dentifrices, a careful and exhaustive search for formulas was made. This search revealed the fact that more than 360 different materials were used in the manufacture of tooth pastes and powders and liquid dentifrices. From the early history of the use of dentifrices to the present time, the trend has been to get away from the cutting action of cleansing bases. Miller's work forcibly called attention to this matter and no doubt had a great deal to do with the increase in kinds of tooth pastes. Since that time there have appeared preparations with excessive cutting action to which many users can attest. Because the dentifrice is in paste form it does not necessarily reduce its abrasive action. A paste can have a rapid cutting action. One has only to review the early formulas to find the reason for changes when it is considered that such materials as charcoal and pumice were used as cleansing bases. The rapidity of cutting action was soon apparent to the user and the preparations were gradually discarded.

Since it is evident that the cleaning action is the most important function of a dentifrice, it would seem that it should receive the most study. It is true that a tooth powder should possess enough antiseptic or germ killing property at least to keep itself free from bacteria. I made some investigations along this line and found that many powders were contaminated with yeasts, molds, and bacteria. It was to be expected that chalk, for example, would be contaminated when one considers the manner of handling and shipping. From the mass of material studied it was learned that the following are chiefly used as cleansing bases: chalk and soap in their various forms, infusorial earth, and tricalcium phosphate.

Chalk—A white or grayish, loosely coherent kind of limestone rock, composed almost entirely of the calcareous remains of minute marine organisms (foraminifera, coccoliths) and fragments of shells, is known as chalk. The purest kinds contain up to 99 per cent of calcium carbonate in the form of the mineral calcite. Silica is always present in small amounts as mineral opal, representing the remains of other minute marine organisms (radiolaria) and sponge spicules; and it is often segregated as the nodular masses of flint so commonly found embedded in chalk rock. Minute grains of quartz, felspar, zircon, rutile, and other minerals are also often present. Not only may there be considerable variations in the composition of chalk but there may also be a wide variation in color (snow-white, gray) and in the texture of the material. Precipitated chalk may be had in a number of different grades, light, medium, and heavy.

Infusorial Earth—Infusorial earth is a natural product consisting of the siliceous framework of the diatoms (Diatomacea). These are unicellular, free-swimming plants belonging to the large group of algae. On death their remains accumulate, under certain conditions, at the bottom of swamps, lakes, and oceans. Diatomite is a loose, pulverulent material with a mealy or earthy texture, resembling soft chalk or dried clay in appearance. It is friable between the fingers, feels harsh, and grates between the teeth. In color it is white, gray, yellowish, or brownish. Chemically it consists of hydrated silica, mixed with various impurities, such as sand and iron. Tripolite differs from diatomite in being more compact. It merely represents the same material of an earlier geologic age. This is the material used in dentifrices.

Percentage of Moisture, Ash, and Insoluble Ash in Seven Different Powders Having a Mineral Base Chiefly of Chalk.

Number	Moisture	Ash	Insoluble Ash
1	0.54	88.82	88.12
2	8.27	63.28	62.56
3	7.15	36.00	32.33
4	1.50	82.00	77.50
5	0.00	71.20	66.43
6	3.50	59.50	47.91
7	3.20	64.80	60.90

Tricalcium Phosphate — Tricalcium phosphate is the insoluble salt of calcium oxide and orthophosphoric acid. It is supposed to represent the chief inorganic constituent of bones. It may be prepared from bones (so-called bone ash or bone-ash phosphate) or chemically by precipitation from a soluble phosphate by reaction with a lime salt, and also occurs naturally in mineral deposits of varying purity and in combination with other mineral elements. The density, crystalline structure, and abrasive quality will vary, depending on the source as well as methods of preparation and grinding.

Soap—It is generally known that soap is made by combining a fat or oil with a water solution of sodium hydroxide or potassium hydroxide. Sodium soaps are always harder than potassium soaps provided the same fat or oil is used in the two cases. The detergent properties of a soap are due to the fact that it acts as an alkali regulator; that is, when water comes in contact with soap, it undergoes what is called hydrolytic dissociation. This means that it is broken down by water into other substances. The various and most important oils and fats used in the manufacture of soap are tallow, cocoanut oil, palm oil, olive oil, poppy oil, soya bean oil, cotton seed oil, corn oil, and various greases. Two different types of soap are used in tooth pastes and powders; dried soda soap or powdered soap and soft soap. Probably, one of the best soaps is of the soft type and made from the pure oils and fats.

It would seem that we can learn a

lesson from Nature's plan of cleaning the teeth by the mechanical action of the fibrous or structural part of raw fruits and vegetables, as well as the fruit juices. It has been said, "the further away man has got from this primitive food, the greater has been the dental troubles." It is not my intention to convey the impression that all one has to do is to eat fruit and vegetables to keep the teeth clean. Unfortunately, the proper cleaning of teeth requires more than that. It does show, however, that whatever the extent of cleaning action, it is accomplished without abrasion.

My attention was attracted to the plant or vegetable kingdom as a source for a cleansing base for dentifrices as a result of eating apples. The sense of cleanliness of the teeth and gums was apparent. Not satisfied with my own experience, patients were asked to observe whether they too felt this effect. Some patients, because of preference, tried oranges while others tried pears. Most of the patients reported that they did notice this sense of cleanliness. As a result of this urge to find a noncutting, efficient cleansing base, about sixteen years ago, a successful attempt was made to produce such a base, from the plant kingdom. The solution of the problem seemed simple at first, but afterward proved to be difficult. It required a review of the entire cellulose field and endless experimental work.

Figs. 11 and 12—Used as controls. In order that the illustrations may be seen more clearly a magnifying glass should be used.

Figs. 13 to 23 inclusive—Varying degrees of abrasion or wearing away of the teeth, depending on the character of material used. The severe cutting shown in Figs. 20, 21, 22, and 23 was produced by pumice.

Figs. 24, 25, 26, and 27—Photographs of the same tooth before and after brushing experiments. Note gingival abrasion in Figs. 25 and 27.

Figs. 28, 29, 30, and 31—Photographs of the same tooth before and after brushing experiments. Note the lack of abrasion at gingival area.

Figs. 32, 33, 34, and 35—Photographs of the same tooth before and after brushing experiments. Note gingival abrasion in Figs. 33 and 35.

Figs. 36, 37, 38, and 39—Photographs of the same tooth before and after brushing experiments. Note that Fig. 37 shows less abrasion than Figs. 25 and 33 and more than Fig. 29.

Cellulose

Cellulose is the principal constitu-

ent of the cell walls of all plants and has on organized structure. It is the framework of the individual cell and in older structures there is an intermingling with encrusting substances. The vital processes of the cell are carried on inside its envelope of cellulose. Young plants or seedlings are nearly pure cellulose and water. As a plant grows, the cellulose fiber becomes coated and combined with encrusted substances of a mineral nature which make for the stability of the fiber. Wood pulp is the best source for this material, and contains besides the cellulose, resins, gums, tannins, lignocellulose, and coloring materials.

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The chemical problem involves the splitting up of the individual wood cell and the removal of all extraneous material. After the logs are separated from the bark, by a series of chemical reactions, a compound is formed which is soluble in water. A high dilution of this compound is made and the cellulose is precipitated out of the solution, by a highly dilute salt solution, the salt combines with the cellulose to a small extent which gives it the desired texture that produces the frictional cleaning action. The resultant material is then reduced to the fineness desired. Brushing experiments show that it does not cut nor abrade and in effect is practically the same as the control. As a dry powder it is capable of producing a high luster of the teeth such as rubbing with a wood point will do.

Conclusion

The time is not far distant when the expression "Use any good dentifrice" will require an explanation as to why it is good. This will be due largely to the activities within the dental profession and the government regulations. A cleansing base for a dentifrice should be nonabrasive not only to the enamel but to the area at the gingival margin or neck of the tooth; also it should not irritate the gum tissues nor cause recession.

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Howard Riley Raper was graduated with the degree of D.D.S. in 1906 from Indiana University School of Dentistry where he taught Materia Medica and Therapeutics, Operative Technique, and Radiodontia for eleven years. Doctor Raper is well known as a frequent contributor to the dental literature, both as the author of periodical articles and of books (Elementary and Dental Radiography, Consolidated Dental Mfg. Co., 1913; ed. 2, 1918, out of print; Electro-Radiographic Diagnosis, C. V. Mosby Publishing Co., 1921; Radiodontia, Dental Items of Interest Publishing Co., 1923; Clinical Preventive Dentistry, Ritter Dental Mfg. Co., 1926.) Doctor Raper was one of the pioneers in the field of dental roentgenography. In 1927 he received the Callahan Medal as an advocate of prevention of toothache as the only practical basis for developing an effective clinical preventive dentistry. Doctor Raper is a member of the A. D. A. and component societies.

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THE EDITOR'S PAGE

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necessaries. Which of the two candidates is likely to be preferred by a man who hears his children cry for bread? I seriously apprehend that in some such season as I have described the people will do things that will prevent prosperity from returning; that you will act like a people who in a year of scarcity devour all the seed corn and thus make the next year not a year of scarcity but a year of famine. It will be, I fear, spoliation. The spoliation will increase distress. The distress will produce fresh spoliation. There is nothing to stop you. Your Constitution is all sail and no anchor. When society has entered on the downward progress either civilization or liberty must perish. Either some Caesar or some Napoleon will seize the reins of government with a strong hand or your Republic will be fearfully plundered and laid waste in the 20th century as the Roman Empire was in the 5th . . . with this difference . . . that your Huns and Vandals will have been engendered within your own country and by your own institutions.

Each of us may decide how soon or how accurately this prophecy may come to be.

WHY DENTAL CARIES WITH MODERN CIVILIZATIONS?

XI. NEW LIGHT ON LOSS OF IMMUNITY TO SOME DEGENERATIVE PROCESSES INCLUDING DENTAL CARIES

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IN THE preceding four installments we have considered primarily immunity and loss of immunity to dental caries as represented in the Eskimos and Indians. This has been expressed as physical perfection of the teeth on the one hand, and their solution by carious processes on the other. The diets have been reported in terms of foods eaten. In this communication the foods will be considered in terms of their chemical and activator content. I have called attention to the splendid development of the dental arches and to the relatively normal position of all teeth including the third molars as well as to normal interrelationship between the two arches, as a constant condition found among the people with highest immunity to dental caries. It is important that it be clearly understood that the reverse of this expression is not true; namely, that normal development of the arches with relatively perfect teeth does not of necessity imply continued immunity to dental caries since even those with a high degree of anatomic perfection of development readily become victims of tooth decay by loss of their immunity when they abandon their native protective foods in favor of modern foods in sufficient quantity. I have called attention to the fact that there was practically no marked irregularity of the teeth found among the most primitive Eskimos and Indians. I shall now present data dealing with the effect of our modern foods on facial and dental development.

Persons were frequently encountered among the more primitive groups who had spent a few months or a year or two in some community on the "outside," as they call it, where they were in contact with modern foods for the time of their sojourn, which may have been from a few months to a few years. These were found to be without active tooth decay at the time of examination but with distinct evidence that at some time they had lost their immunity and caries had become active. On inquiry we would always find that these persons had left the environment and foods that had previously established and maintained their high immunity, and that the serious injury that we found had occurred some time in the past. From the history, the condition could be clearly related to the period when they were away from the defensive native foods. Their arches would, of course, still be regular except as extractions or loss of crowns would permit movement of the teeth and the establishment of faulty interrelations. Their perfect faces and normal development indicated that they had had normal nutrition both prenatal and postnatal, and during the period of development of the face and jaws. When, however, we found ourselves in a community that had been in contact with foods of modern civilization since before the persons being examined were born we found routinely evidences of disturbance in physical development. It is of interest that this occurred in precisely the same expressions among the Indians as among the Eskimos. It therefore was not related to ancestry nor to the type of primitive foods that had been abandoned inasmuch as the foods were entirely different for these two races. The primitive Eskimos live almost entirely on the animal life of the sea and the primitive Indians of the interior, in the groups studied, on the animal life of the land.

In general these developmental defects may be classified as lack of development forward of either the middle third of the face or the lower third of the face or both or a lateral narrowing of one or both the upper or lower dental arches. These would result in an apparent protrusion or retrusion and in the jumbling of the teeth in the arches in which various teeth would be crowded out of their proper alinement. Associated with this lack of development in the middle third of the face there would practically always be a narrowing of the nostrils with a more or less marked interference with breathing, often resulting in typical mouth breathing and evidence of lack of normal chest development and normal lung expansion. A typical illustration is seen in Fig. 1 in which the lower anterior teeth will be seen to be well forward of the upper anterior teeth. In the less severe expression of this type there would be a tendency to an end-to-end bite on the centrals with the laterals going inside the arch with a consequent contraction between the cuspids and lack of prominence of the upper lip and a depression and narrowness at the base of the nose with an absence of normal width of the middle third of the face owing to the lack of normal cuspid prominence. The cuspids may appear to be too prominent but only because of the depression of the bicuspids and incisors. A typical case is shown in Fig. 2.

Irregularities of the teeth and dental arches have been explained by many and varied theories; for example, the premature loss of deciduous teeth. A common explanation has been the intermingling of races in which the large teeth of one race have been inherited and the small jaws of another race with the result that there is insufficient room in the arch for the teeth. It is important to note that these conditions were found just as constantly and typically among the pure blood Eskimos and the pure blood Indians as among the mixed bloods of these races with whites. It is also of interest that the whites living in the same community and on the same type of modern diet had comparable conditions as shown in Fig. 3.

The problem of the impacted lower third molars is a common one in our modern civilizations but it was not found among the more primitive Indians or Eskimos living on their native foods but did occur with regularity when the individuals of these races were on modern foods during the period of their growth. This was often found to be associated with either lack of development in the middle or lower third of the face or both. A considerable percentage of the developmental disturbances had their expression in the lack of development in the lower third of the face with the chin receded. A typical case will be seen in Fig. 4 in which the lower anterior teeth are so far posterior to the uppers as probably to be in contact with the soft tissues. The deformity that was most frequently

Top—left to right—Fig. 1—This is a typical illustration of the incomplete development of the middle third of the face with constriction of the nostrils and nares. The chin appears to be too prominent; it is, however, relatively normal.

Fig. 2—Incomplete development of the premaxillary and maxillary bones produces a typical tendency to an end-to-end bite as seen in the case of the upper centrals with the lower incisors. The laterals erupt inside the arch. There is a narrowing between the bicuspids.

Fig. 3—This white boy is a son of a mining engineer. He was born in Alaska and reared largely on imported foods of white men. He is a typical mouth breather. Note the lack of development of the nose and middle third of the face.

Bottom—left—Fig. 4—In some cases the nutritional deficiency disturbs chiefly the development forward of the mandible as shown in this figure giving the effect of protruding upper incisors.

Fig. 5—Tuberculous glands are often the first expression. With proper care and adequate nutrition many of these patients could be saved. This boy is typical of hundreds.

Fig. 6—Skeletal involvements are common manifestations of nutritional deficiencies with development of arthritic processes. This boy will probably soon be bedridden.

seen, however, involved the lack of development of both the lower and middle thirds of the face often resulting in marked irregularity of the teeth in both arches.

As serious as these developmental factors are because of their production of deformity and the interference with normal breathing and mastication we have another important observation that I believe is an entirely new contribution to our knowledge and one that has grown out of these special investigations. In my discussion of the conditions in the Outer Hebrides and the Isle of Bardsey in the August, 1933, number of THE DENTAL DIGEST, I presented data illustrating the marked difference in facial development of two typical groups. I used a picture of a group of children from the Isle of Harris whose diet had been limited almost entirely to the native foods, chiefly sea foods and oat products, and whose facial development was fine and regular. All were normal nose breathers. In contrast with this I showed a family of four children whom I photographed on the Isle of

Bardsey, all living on modern foods. All were mouth breathers and all had marked lack of development of the middle third of the face as well as having active dental caries. I also reported that on that island the death rate for tuberculosis had been so great that it became necessary a few years ago to repopulate the island by moving a number of families there for residence. I also reported that the incidence of dental caries among that group was high; namely, 27.6 out of every one hundred teeth examined had been attacked by tooth decay, while in the control group on the Isle of Harris living on native foods the incidence of caries was negligible; namely, only one tooth in each one hundred teeth examined.

In the seventh installment (February, 1934, the DENTAL DIGEST) of this series, in discussing the modernized Indians of the Six Nations Reservation in Ontario I used as an illustration a girl of 12 in bed in the government hospital whose teeth showed marked irregularity and active tooth decay. This girl was suffering from pulmonary tuberculosis. In installment 4 concerning the Outer Hebrides, I reported the rapidly increasing incidence of tuberculosis among the younger generations necessitating a special wing for women under 30 years of age which had recently been added to the tuberculosis sanitorium at Stornoway. In my investigations among the Indians of the Pacific coast I referred to a large number of homes in which one of the children was either sick with tuberculosis or in which a death had occurred from tuberculosis. This condition has also occurred among the modernized Eskimos. It is common knowledge that tuberculosis is one of the important causes of premature death among the modernized Indians and Eskimos. Among the theories that have been presented and perhaps the one most frequently accepted is that the ancestors of these people had not been exposed to tuberculosis and consequently they had not built up an immunity to be transmitted as an inherited defense against this disease to which their children have been exposed as part of their contact with modern civilization; hence this new generation has had an exposure factor that is different from that of their ancestors, which is all that was needed since their defense was by inheritance low. This argument becomes particularly forceful in view of the report from pathologists that practically all the lungs of adults that have not died from pulmonary tuberculosis show calcified tubercles as an evidence of an early active infection and an efficient healing process. As I have investigated young people who are developing active tuberculosis in various countries where immunity to dental caries has been lost with the present generation, I made a critical study to note the relationship between any physical defects from nutritional deficiencies and their loss of immunity to tuberculosis. I have been impressed with the frequency with which this break has been found to be related to a lack of normal development of either the middle or lower third of the face or both, involving one or both dental arches with irregularity of the teeth.

In the government hospital at Juneau there were twenty Eskimos and Indian boys and girls reported to be under 21 years of age who were bedridden with pulmonary tuberculosis. Every one of these boys and girls had marked evidence of nutritional disturbance in early childhood which in the light of accumulating data involves both prenatal and postnatal nutrition with the chief deficiency usually occurring in the first five years of life. It is particularly important to note that the first or deciduous teeth may be in normal relation and the permanent teeth erupt badly out of alinement. Unfortunately, the light in the hospitals was not adequate for making excellent snapshot exposures of the bedridden patients.

The condition of narrowing of the upper arches due to a lack of normal development of the premaxillary and maxillary bones results in the narrowing of the air passages which greatly restricts free ventilation.

Does our boasting civilization which is so ignorantly but so thoroughly accomplishing the extermination of the American primitives know how to produce as good bodies and maintain as good health and as high a resistance to disease as do the primitive Indians of the isolated interior? Unfortunately, the cost of modernization to the primitives is not limited to the pulmonary form of tuberculosis. In the communities in contact with modern civilization the children were often found with suppurating tuberculous glands of the neck which for them was the beginning of almost certain progressive decline and ultimate death as the disease extended throughout the system. Large numbers of these children had incomplete development of the dental arches, with dental caries and irregularity of the teeth. A typical case is seen in Fig. 5.

I found an Indian in one of the older modernized coast towns who said he had not fed himself for forty years. He, as others who were described in previous installments was bedridden because of arthritis. No animals taken from the wilds and placed in cages could suffer more intensely from enforced confinement than these boys and girls of the echoing mountains and multicolored valleys with their great stretches of timber and beckoning streams. One can never forget the pathetic appeal for help of these boys and girls who are progressively becoming crippled and who seem to sense their doom like the young arthritic patient shown in Fig. 6.

Some may be tempted to say that since the native foods were amply rich in material for making healthy bodies and repairing them people who could not get anything else deserved little credit for special knowledge. Over against this we have the important factor to keep in mind that they had no food that we do not have, relatively speaking, and that we have many good foods that they do not have; yet they accomplished what we have failed to achieve.

The people of the high isolated Alpine valleys whom I studied in 1931 and 1932 lived largely on entire rye and dairy products yet with these they built their superb physiques with almost complete freedom from dental caries. In the Outer Hebrides the more primitive groups could not get either of these foods and indeed could get little else than oats for oatcake and oatmeal porridge and fish and other animal life of the sea. The more primitive Eskimos that we studied in 1933 could not get either oats or rye nor any other cereal or dairy products. They had little food except animals of the sea. In the interior, inside the Rocky Mountain Divide little marine food was available and the splendid physiques of the Indians were built on foods consisting almost entirely of wild game. None of these four groups had any appreciable quantity of vegetables or fruits. The last two groups had practically none at all, except that the Eskimos and Indians occasionally had a small quantity of cranberries and some bark and roots which would be a small part of the menu.

Since each of these limited menus has been competent to build splendid physiques and establish and maintain a high immunity to dental caries we are deeply concerned to know the chemical content of each. An important part of these field investigations has accordingly been the collecting of samples of the various foods eaten, and the shipping of them to my laboratory for chemical analysis.

We are now concerned to study critically the nutrition of the Indians of the interior with their excellent physiques and freedom from disease

TABLE 1.—*The Distribution of Activators and Minerals in a Typical Menu of Primitive Indians.*

Calories	Food	Fat Soluble Activators	Calcium	Phosphorus	Iron	Magnesium	Copper	Iodine
2500	Flesh of Wild Game	++	0.58	4.16	0.13	0.35	0.0033	0.000014
400	Glands and Organs	++++	0.10	1.49	0.025	0.066	0.0189	0.0000087
100	Vegetables, Barks & Roots	+	1.62	0.96	0.031	0.266	0.0032	0.0000013
3000		+++	2.30	6.61	0.186	0.682	0.0254	0.0000240

TABLE 2.—*The Distribution of Activators and Minerals in a Typical Menu of Primitive Eskimos.*

Calories	Food	Fat Soluble Activators	Calcium	Phosphorus	Iron	Magnesium	Copper	Iodine
1700	Salmon	+++	1.24	2.68	0.048	0.710	0.022	0.000072
200	Seal Oil	++++						0.000015
100	Plants, Roots	+	0.49	1.40	0.035	0.26	0.002	0.000016
500	Sea Animals	++	0.36	1.02	0.014	0.21	0.0065	0.000021
500	Caribou	++	0.05	0.60	0.003	0.093	0.0007	0.000007
3000		+++	2.14	5.70	0.100	1.273	0.0312	0.000131

TABLE 3.—*Mineral Distribution in a Typical Menu of Modernized Indians and Eskimos.*

Calories	Food	Fat Soluble Activators	Calcium	Phosphorus	Iron	Magnesium	Copper	Iodine
1200	Bannock Bread	—	0.13	0.42	0.003	0.09	0.0144	0.00000006
1200	Sugar, Jam, Syrup	—	0.15	0.24	0.06		0.0009	0.0000006
1100	Chocolate, Coffee	—	0.02	0.07	0.0004			
300	Meat	++	0.03	0.33	0.0027	0.032	0.0004	0.0000016
100	Vegetables	+	0.06	0.08	0.001	0.022	0.0010	0.0000005
100	Vegetable Fats	—						
3000		+	0.39	1.14	0.0671	0.144	0.0167	0.00000276
% Reduction: Indians		90+	83	83	64	76	34	88
% Reduction: Eskimos		90+	82	80	30	87	47	98

and high immunity to dental caries for comparison with those of the same tribe or bands who have been in contact with modern civilization and who are breaking physically. The food of the former was found to consist almost entirely of wild game but this does not mean what we moderns would understand by a meat diet. In the ninth installment (April, 1934, the DENTAL DIGEST) in discussing this group I referred to their conception of what was necessary to life as requiring each person to eat some of each part of the animal. This did not, of course, include indigestible structures, such as hide, hair, hoofs, horns, or bones, but did require that the marrow be taken from bones and that even the walls of the intestine or stomach after having been thoroughly cleaned should be utilized for foods as well as the tissues of every organ and gland of the body of the animal. I was told by different Indians that even when plenty of moose were available the livers of small fur animals were utilized for food. It must be kept in mind that these people are living a vigorous outdoor life in a country where they are subjected to intense cold in the winter.

A white trapper with whom I talked told me that by following the methods of living of these Indians he was able to sleep out in the open, night after night, for weeks with no other shelter than his furs and blankets and the evergreen trees with the weather far below zero. He did this without catching cold or suffering from cold. It follows that the very nature of their life requires that these primitives be hearty eaters in order that they may obtain adequate calories to supply heat and to provide the energy for their long tramps on their trap-lines. This physical activity on the part of all required a daily intake of foods which consisted of various parts of the animal prepared in different ways generally cooked either on spits before the open fire or in kettles as stews. The average amount eaten as I would judge from the sample servings, would be from 5 to 7 pounds per day per individual adult. These Indians were conscious that certain of their foods were much better than others. While they liked the flavor of the caribou several Indians informed me that they could travel farther and do more work on a moose diet than on caribou.

These living conditions of the Indians, as studied in the interior, which subjected them to severe exposures and vigorous activity would require as with the Eskimos a specially liberal supply of fuel for maintaining the warmth of the body. This for the adults would amount to from 3000 to 4000 calories per day. On the basis of the minimum of 3000 their daily intake would probably be about as follows: muscle tissue and fat, 2500 calories; glands and organs, 400 calories; and barks and roots, 100. The minerals of these would be distributed as shown in Table 1 and would total: calcium, 2.30 Gm.; phosphorous, 6.61 Gm.; iron, 0.186 Gm.; magnesium, 0.68 Gm.; copper, 0.0254 Gm.; iodine, 0.000024 Gm. The total weight of this food would be 4.8 pounds per day or 2176 Gm.

The activating substances essential for the utilization of the minerals are stored in various animal organs and tissues for periods of special need. The Indian knows where these special life-giving substances are to be found and he like the wild carnivorous animal is wise in food selection. He accordingly selects the liver, brain, kidneys, glands. Part of every day's food for the Indians includes eating some of these special tissues. The parents provide these for the children and teach them their special values.

Similarly the native foods of the more primitive Eskimos consisted, as I have reported, almost entirely of the tissues of animal life of the sea. But this is not quite what would be likely to be understood from this simple statement by our modern civilization which limits the use of animal tissues largely to muscles, whether fish, beef, or mutton. Like the Indians of the interior who live on the animal life of the land the Eskimos eat not only the muscle part of fish and other forms of aquatic life but the livers and hearts and in many cases the edible parts of the head; also the milt and roe when these are present as is the case when the fish are running toward their spawning grounds which is the time the principal harvesting is done. While it is true that some Eskimos occasionally get moose or more frequently caribou for a part of the year, these are not often available for the Eskimos living along the Bering Sea. The severity of their weather requires that they provide their bodies with large quantities of fuel for the production of heat. The adult Eskimos will accordingly probably average as calories intake from 2800 to 3500 and for the growing children from 2500 to 3000. This would be provided largely by the stored smoked dried red salmon. This salmon is dipped in seal oil as it is eaten. Both of these products are high in fat-soluble vitamins. The seal oil is one of the richest available sources, for the sample that I brought proved to be several times as high as ordinary cod liver oil. I have allowed 200 calories to be supplied by this product which would be about 1 ounce. Small quantities of

parts of several plants are used when available. One of these is a bulbous root which grows on the tundra and which is gathered and cached by the wild mice. The Eskimos appropriate this food. They also use at certain times of the year stems or roots of certain plants, particularly the growing parts. For these vegetable products I have allowed 100 calories per day. The flesh of walrus, seal, caribou, moose, sea cow, and occasionally whale should be a regular part of the menu according to the season. The proportion of the first and last items; namely, the red salmon and the seal, walrus, moose, caribou, and sea cows, would vary with the seasons. Probably a fair average of calories for the salmon used daily would be 1700, and for the seal, walrus, moose, and caribou meat 1000 calories. This total of 3000 calories per day would provide 2.14 Gm. of calcium, 5.7 Gm. of phosphorous, 0.1 Gm. of iron, 1.27 Gm. of magnesium, 0.0312 Gm. of copper, and 0.000131 Gm. of iodine. The total weight of the food would be 5.07 pounds or 2295 Gm. A detailed distribution of these minerals is shown in Table 2. These quantities would establish a high factor of safety. Since, however, the salmon, seal oil, and fats of sea animals are rich in fat-soluble activators this menu would have a remarkably high factor of safety, because with such liberal quantities of the fat-soluble activators a larger proportion of the total minerals present would become available for use by the body.

The foods of commerce that displaced the native foods of the primitive Indians and Eskimos consisted of those foods that can be transported in concentrated form and that have keeping qualities; also, low first cost and palatability. The fact that these foods have to be transported long distances and over difficult routes greatly increases their value by the time they reach the consumer and since they are exchanged in large part for furs the prices at the outside market value have little to do with the prices on the inside.

I inquired routinely where modern foods were available what exchanges were usually made. I found that the principal articles of food are white flour, sugar, jams, syrups, canned fruits, canned vegetables, polished rice, tea, salt, chocolate, and vegetable fats. By far the largest quantities of imported foods that were used by Indians and the Eskimos were white flour and sugar. I was surprised to find the relative proportions of the various foods used. At nearly all Posts and Exchange Stores the Indians and Eskimos were taking in trade as much sugar as white flour. In a few places half again as much sugar as white flour, and in one Post the manager told me that the Indians of that vicinity were taking 250 pounds of sugar with 100 pounds of white flour in exchange for their furs. When I inquired how they could use this quantity of sugar he informed me that they sweetened their tea until it was like syrup and that they found they did not get hungry when they drank a great deal of this sweetened tea. In some districts they used in addition considerable quantites of polished rice. In both the Indian and Eskimo communities the white flour was used largely for making "bannock" which is a baking powder bread, stirred up and put on the fire in a skillet and is prepared and cooked in a few minutes. When it is baked part way through from one side it is thrown into the air, caught in the pan the other side down, and the baking continued. They do not have any native milk, and, except for the salt that is added, it is a flour and water product. The bread is snow white and was to be seen in many of the homes where the Indians and Eskimos were using largely modern foods. In some communities they eat this bannock with corn syrup. Owing to the weight of the canned vegetables they are expensive and accordingly not liberally used. The proportion of native foods that are still eaten is influenced by the distance from the hunting grounds and the nearness to the Post. There was much evidence that what formerly was cheerfully accepted as routine work readily became disagreeable when they found they could get their hunger satisfied without the exertion of stalking the game and carrying it to camp. This is not always pure laziness but is influenced by the desire to be like the white men they have seen who do not need to work at such physically tiring duties as carrying heavy loads of game or, among the Eskimos, making a sea journey in all kinds of weather in search of animal life of the sea. Naturally the people tend to congregate in the vicinity of the Post or Exchanges. This of necessity increases the ratio of human beings to the wild game of that vicinity and this progressively increases the distance that must be traveled to get to the game country.

For both the Eskimos and Indians who have displaced a considerable portion of their native foods with the foods of modern civilization since they are living under the same exposure of cold, we will estimate their mineral intake on the same basis of calories notwithstanding the fact that with the decreased exertion necessary for stalking and carrying their wild game or their sea foods they would actually have less demand for energy as supplied from the foods. The principal displacing food that they obtain from modern civilization is white flour and next to this in energy production is the sugar, syrup, and jams. In some instances, however, the energy produced by the foods containing sugar would be higher than that from the white flour products. They would still continue to use some meat although in greatly reduced quantity. In some instances they purchase vegetable fats of commerce. On a basis of 3000 calories this modernized Eskimo or Indian diet would supply the quantities of minerals shown in Table 3; namely, 0.39 Gm. of calcium; 1.14 Gm. of phosphorus; 0.067 Gm. of iron; 0.14 Gm. of magnesium; 0.0167 Gm. of copper; and 0.00000276 Gm. of iodine. The total weight of the food would be 2.72 pounds or 1225.5 Gm. This modernized diet is exceedingly low in fat-soluble vitamins, their being practically none in white flour, sugar, syrup, jams, chocolates, coffee, and vegetables. Since their muscle meat, glands, and other organs of animals of the land for the Indians, and of the sea for the Eskimos, would be reduced approximately to one-tenth, this would decrease the total fat-soluble activators per day to a quantity below the minimum bodily requirements of even an adult. This will make it impossible for them to utilize properly even the small amount of minerals that are present in the foods ingested besides being insufficient to maintain the functioning of various organs and tissues of the body. It is at this point that their greatest injury occurs. Even if they could utilize all the minerals that are available the intake for those on the modern foods is reduced as shown in Table 3 to less than one fifth of that in the original diets for several of the minerals. This means tragedy especially for growing child life and motherhood because of their greater demands.

Since these modernized Eskimos and Indians do not have a large variety of foods such as are available for people of most modernized communities the urgency that their problems shall be met is even greater than the needs of the white races. These two races have been developed through thousands of years of adaptation to their environment and its limited available native foods. The rigorous climate makes necessary a more efficient and highly reinforced nutrition than that of the more temperate climates. It will probably be a physical impossibility to maintain

healthy Eskimos and Indians in those northern climates or in any climate on foods that are so poor in minerals and vitamins as those being made available to them.

It will, accordingly, be imperative if these races are to be conserved that the transportation of foods that are low in minerals and vitamins shall not be made available to them. This could readily be accomplished by requiring that entire wheat, preferably unground, shall take the place of white flour. The wheat can be cooked whole and made into various food products without difficulty. This, however, is not essential since the wheat can readily be ground into coarse or fine flour as required at the Hudson Bay Posts or Exchanges. It will not be satisfactory to have the wheat shipped in as entire wheat flour since the embryo or germ of the wheat will rapidly become oxidized or rancid and this food product will have lost much of its intrinsic virtue. Whole wheat flour will also become wormy. Similarly, sugar which contains practically no minerals, also jams, marmalades, and syrups should be either prohibited from reaching these people or at least sold only in very small quantities. Canned meats and canned fish will provide minerals though they are much lower in the natural activators than the fresh or dried and smoked products.

It will be a matter of importance that sources for supplying a liberal quantity of the native foods from the sea for those near the coast and from the land for those in the interior, far away from easy access to the source of marine foods, shall be maintained. Since it is impossible in the northern climates for vegetables to be produced in large quantities for use in a fresh state the year round, those people cannot readily be adapted to a diet that would be competent to protect and maintain the people of any race in the temperate zones. It will doubtless be essential to provide reinforcement as fat-soluble activators or vitamins for these people in proportion as they depart from their native food sources for these essential products. This cannot readily be done with dairy products since cattle cannot be maintained in so rigorous a climate. Imported fish oils should accordingly be available as an important reinforcement for groups both near the coast and in the interior. A logical procedure for the coast Indians and Eskimos would be to provide unrestricted fishing facilities on certain and sufficient of the rivers where their right to life would be recognized as taking precedence.

The more direct application of these important new truths to the needs of our modern civilizations not only for the control of tooth decay but for establishing a similar defense to other degenerative processes involves the modification of the modern diets to make them equivalent in their supply of minerals and activators and other chemicals to those foods that have built and are maintaining the splendid Eskimo and Indian races. The principles are the same as those demonstrated to obtain in the studies made in countries of Europe and reported in the DENTAL DIGEST from March to August inclusive, 1933. In the August number of that series detailed practical application was made to the modern diets with clinical data illustrating the ease with which these principles could be successfully applied to the needs of modern civilizations. Readers are referred to that review since space does not permit an extended application here.

New light has been thrown on the origin of facial deformities and dental irregularities as well as on defects of physical development in other parts of the body; also on some factors involved in the lowering of immunity to infections, such as tuberculosis and arthritis. These emphasize the urgent need for governmental supervision, if necessary, of the nutrition in child life and motherhood in all lands.

The report on the chemical analyses of the samples of saliva obtained from the Eskimos and Indians in various stages of modernization cannot be included here for lack of space.

A critical discussion and detailed application of these various factors are being provided in a textbook under the title THE ETIOLOGY AND CONTROL OF DENTAL CARIES AND ASSOCIATED DEGENERATIONS. This publication has been delayed by the industrial depression.

These field studies among primitive peoples are being extended to the Polynesians and Melanesians of the South Sea Islands.

Dental Research Laboratories
8926 Euclid Avenue.

THE DENTAL SCENE

(*Continued from page* 231)

Listen for accents, read the street signs and shop names, examine the wares. That's fun.

I complained to a guard in the interesting art museum of The Irish Village that I expected to see "the little people" of Irish legend frolicking about, and in his Dublin earnestness he told me I could if I came between twelve and one in the morning when the moon is out. A cricket was heard by the hearth in the museum, he told me, and "the old woman" was seen at the spinning wheel where she moaned the moan of her ghost. I checked my skeptical smile as he pointed to some paintings on glass representing the legends of his people: The Fairy Lantern, Deidre of the Sorrows, and The Leprechaun or Fairy Cobbler. When one finally leaves the museum and looks out over capricious Lake Michigan, there is an urge to call the lake the sea. [Spain and Italy (and Mexico, over on the island) also benefit thus by their locations.] But lest there is given the impression of too much fable in Ireland, there is The Lighthouse on the boardwalk, a modern night club in lighthouse costume.

I did not mean to forget the streamlined train; the "electric button" bedroom of utopian comfort in the air-conditioned house; the 1934 version of the pageant, Wings of a Century with its Mississippi Mardi Gras scene; the Venetian glass-blowing exhibit; the other villages and "streets" for those who would like them; Mrs. Thorne's collection of Miniature Rooms—and I did mean to urge visiting dentists to see the Fair skyline and architectural and lighting arrangements from towers and from the water. But if nothing is seen at the Fair except the Lagoon Fountain (actually fountains) in full display, the single most overwhelming vision at A Century of Progress Exposition of 1934 will have been seen. There is the danger of seeming overenthusiastic, but one reason for visiting Versailles is to see its fountains —feats of engineering in their day— but now . . . The Lagoon Fountain boasts no rare and sculptured marble, but man-made, jewel-painted water formations are rarer.—E.H.D.

ACUTE CELLULITIS

R. A. PENNY, D.D.S.
Beaver City, Nebraska

CELLULITIS is commonly seen in its milder forms. Any of the milder forms may quickly become acute depending on the virulence of the organism present and the resistance of the patient. The color of the pus and the amount present represent to a degree the seriousness of the type of infection. A small amount of white pus usually indicates a virulent type of streptococcus predominating. A large amount of yellow pus indicates a predominance of the staphylococcus group and is of less serious consequence. A smear of the pus is the accurate method to follow to determine which organism is present.

The symptoms manifest themselves by severe pain, swelling, rise in temperature, rapid pulse, trismus, and rapid onset.

Acute cellulitis is a bacterial infection.

The blood picture changes with the leukocytes doubling or tripling in number.

The temperature is above 100°F., usually from 102 to 104°F.

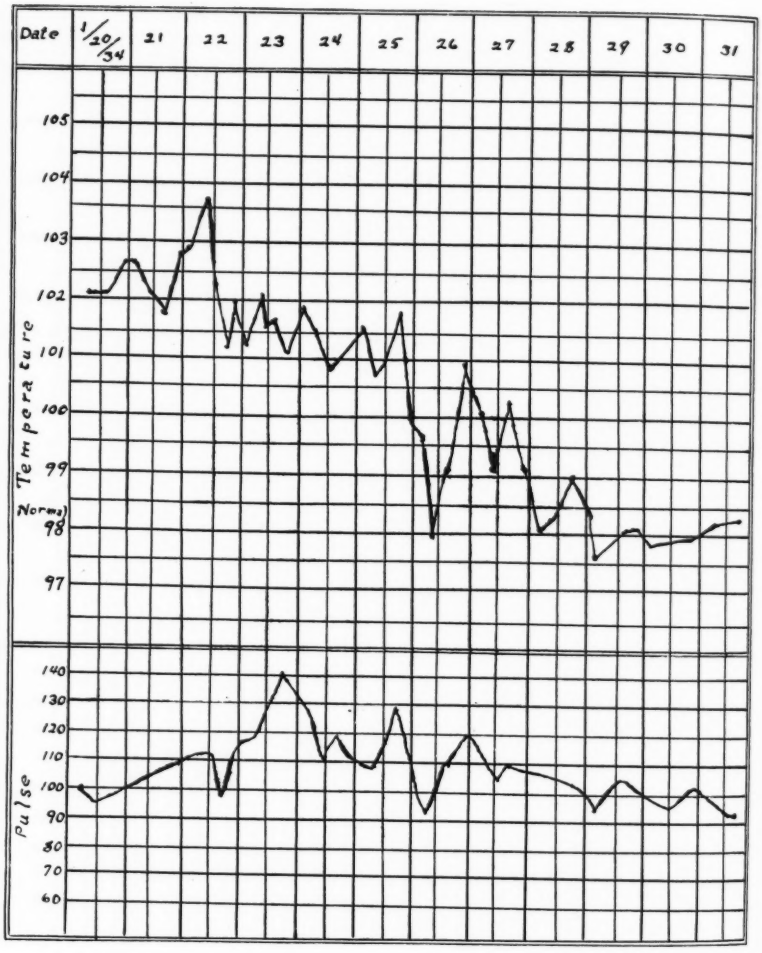
Treatment

In the milder cases, a thorough examination, including roentgenograms and the taking of the case history, with sedatives given to control pain, and drainage established, if possible, is usually sufficient.

The severe cases require more careful handling. Patients with temperatures above 100°F. should be put to bed. Magnesium sulphate may be prescribed with copious amounts of water, every two hours if necessary. Should this treatment fail in about six hours, an enema should be given. Elimination is essential.

Many patients with acute cellulitis do not respond to ordinary sedatives and for this group a narcotic is indicated. Cold packs are usually used at the onset, later followed by hot magnesium sulphate packs, and, as the case progresses, these may be alternated. With the count from 20,000 to 25,000 leukocytes, 10 cc. of 1:1000 hydrochloric acid or 10 cc. of 1:1500 metaphen may be given intravenously.

Should the pulse become rapid above the normal limits, digitalis may be prescribed by a physician.



A woman, aged 26, whose general health was excellent had the lower left third molar removed under local anesthesia, because of local chronic tenderness. The tooth was not impacted and was not treated prior to its removal. The patient was referred to me the third day following the extraction, because of severe pain, swelling, and trismus. The graph shows the temperature and pulse record during her hospitalization.

Drainage should be obtained as quickly as possible but it would be unwise to attempt drainage in an area where the infection had not localized.

The technique to be used in any doubtful case with regard to the point of localization should be exploratory. This may be accomplished by first inserting a hypodermic needle in the suggestive area and withdrawing the contents. When the tissues are found to contain pus an incision is then made through the superficial layer. This is followed with blunt dissection, either with the gloved finger or a pair of blunt-end hemostats. Drainage is thus established in the deeper layers with less danger to the vital tissues or of spreading the infection. A rubber drain is then

placed to prevent the rapid closure of the wound.

After localization and drainage the recovery is rapid.

Conclusion

Small chronic areas of infection so often seen around lower third molars should be eradicated before the extraction of these teeth to prevent cellulitis.

Teeth with acute inflammatory conditions should be treated prior to their removal. Many acutely infected teeth can easily be drained through the root canal, and then removed as soon as the acute symptoms subside. Others in a later stage may be incised with excellent results.

Most of the cases of acute cellulitis can be prevented if a little more attention is given to the etiology.

LIGHTING OF THE DENTAL CABINET

H. J. CHRISTEN, D.D.S.
Lemmon, South Dakota

MOST dental offices have proper lighting facilities except for one important piece of equipment; namely, the dental cabinet.

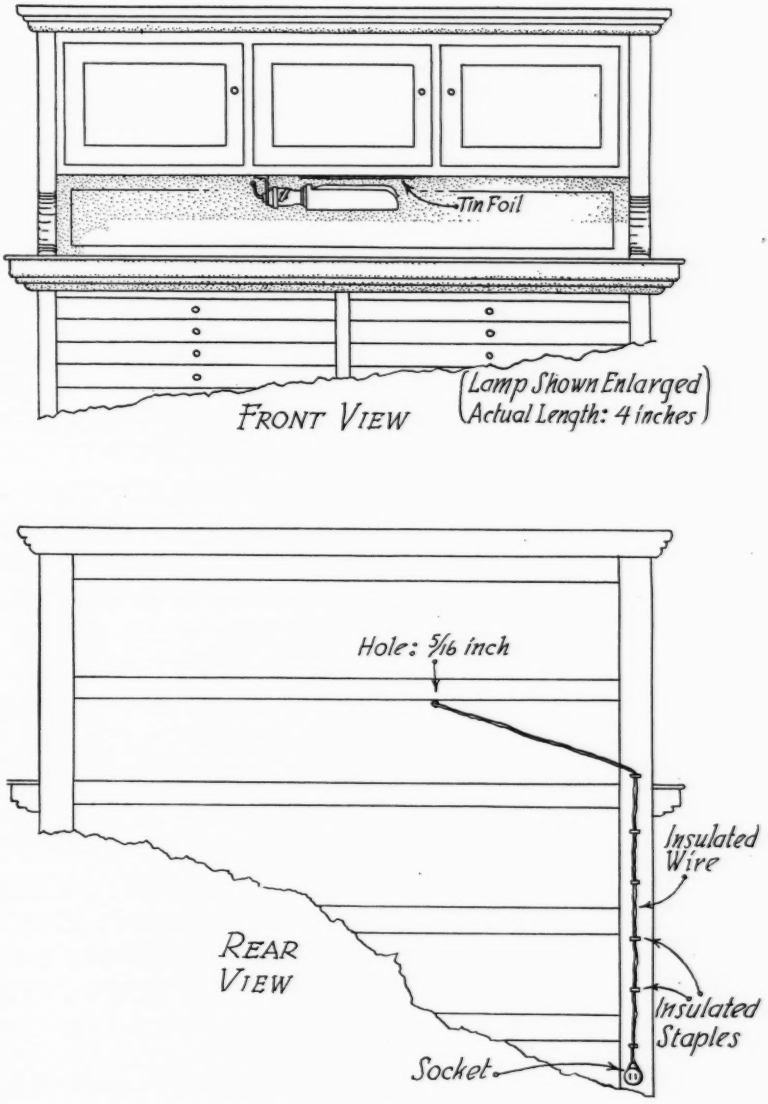
During night work and also in winter and fall when more artificial light is necessary, I noticed that the working surface of the dental cabinet was always dimly lighted and that shadows were cast because the dentist must stand between the source of light and the working surface. This was particularly annoying to me when trying to pick a bur from the bur block. It was necessary to turn toward the lighted unit and then select the bur in the view of the patient, which had a bad psychologic reaction on some patients.

Also, in mixing cement or porcelain, the poor light made it difficult to judge the proportion of powder to be added to the liquid. Then, too, in the preparation of the syringe for local anesthesia, it was difficult to see whether all air bubbles had been expelled from the syringe.

To supply this need for light, I installed a sewing machine light fixture complete with a 15 Watt bulb. This installation required only the cutting of a hole, five-sixteenths inch in diameter, according to the accompanying diagram, through the wood above the mirror. The insulated wire was run through this hole.

The light fixture is held in place by two wood screws, and the reflector is turned upward so that light is directed upon the bottom of the medicine cabinet. On this surface a piece of tin foil is glued, and an insulated wire is fastened on the rear of the cabinet, as shown in the diagram. The current is plugged in and indirect lighting is obtained on the cabinet working surface without any glare or shadows to cause annoyance.

First National Bank Building.



Sketch showing unique lighting arrangement. Note specifications carefully.

ACKNOWLEDGED

It is acknowledged that serious consequences follow neglect of the teeth. Acknowledged, too, that the use of a dentifrice which cleans safely and thoroughly is a valuable supplement to your professional care of patient's teeth.

Safe cleansing implies the use of a safe cleansing agent. Simple household cleansing agents are often suggested for use in the mouth. These may be satisfactory if it is certain that their continued use does not result in irritation or abrasion and the establishment of some abnormality.

Milk of magnesia, one of the principal ingredients of Squibb Dental Cream, is acknowledged as a safe, simple cleansing agent, scientifically correct for constant use. It has a high antacid reserve which aids in combatting the acid by-products of uncleanness.

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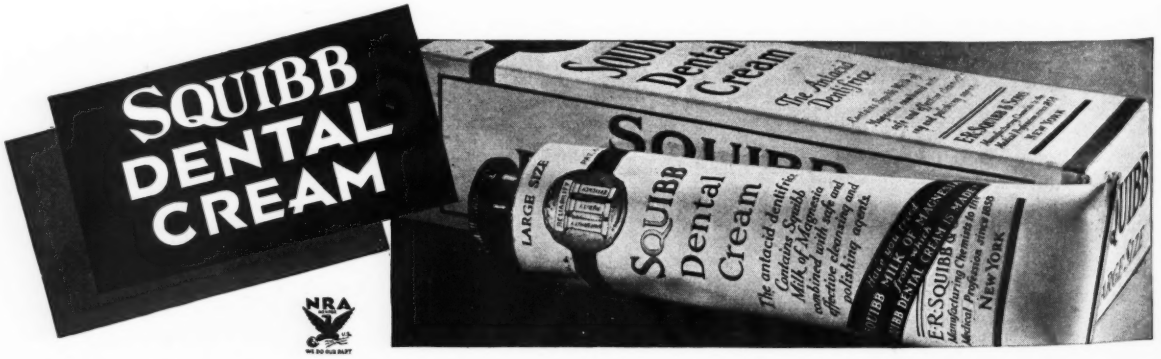

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—Suggested by S. Joseph Bregstein, D. D. S., Brooklyn, New York

*This is the first in the second series of charts intended for the use of the dentist in explaining important normal and pathologic dental conditions to his patients. The first series is now available in booklet form.

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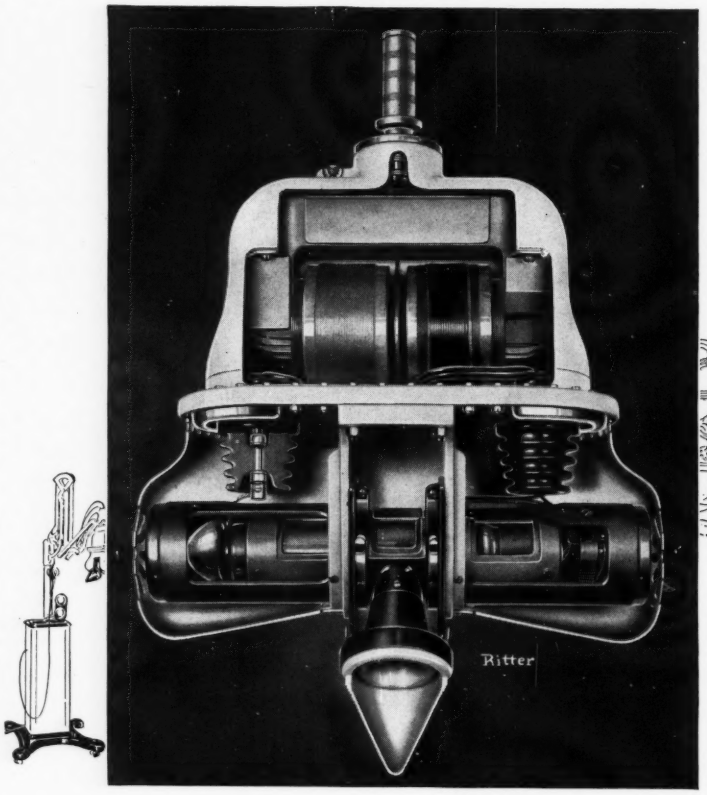

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